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TOTAL QUALITY MANAGEMENT AND SUCCESSFUL COMPLETION OF THE AMAHORO STADIUM RWANDA

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A DISSERTATION SUBMITTED TO THE GRADUATE SCHOOL IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION AND PROJECT MANAGEMENT OF THE UNIVERSITY OF KIGALI.

January, 2025

DECLARATION

I, LARRY DANIEL KAETU-SMITH, declare that this dissertation is my original work and has never been submitted or presented at any higher learning institution or university for award of master's degree.

Signature …… ……

LARRY DANIEL KAETU-SMITH Date

APPROVAL

I do certify that I have passed through and read this dissertation, and I hereby recommend for the acceptance by the University of Kigali, a research dissertation entitled "Total quality management and project success. A case study Amahoro stadium, Rwanda"

Signature …… ……

Prof. MADICHIE NNAMDI Date

DEDICATION

This research proposal is dedicated to my beloved mothers; Alice Q. Williams and Cecilia Winter whose unwavering support and endless encouragement have been my guiding light throughout this journey. I have the pleasure to also dedicate same to my sisters; Sedia W. Wollor and Danlette W. Seimavula along with all family members who in their little ways help me reach this milestone. Most importantly, I am delighted to dedicate this work to all my lecturers at the University of Kigali who taught me during the course work, while pursuing masters of science in Project management at the afore mentioned University. Their endless work hell equip me with necessary knowledge to further pursue my carrier.

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My Almighty God blesses all of you.

LARRY DANIEL KAETU-SMITH

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LIST OF ACCRONYMS

BS ISO : British Standard-International Standard Organization
ISO : International Standard Organization
PMI : Project Management Institute
QA : Quality Assurance
QAPs : Quality Assurance Practices
QC : Quality Control
SMEs : Small and Medium Enterprises
SPSS : Statistical Package for the Social Sciences
TQM : Total Quality Management
TWA : Theory of Work Adjustment
UoK : University of Kigali

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ABSTRACT

This study examines the relationship between Total Quality Management (TQM) practices and project success, specifically focusing on the rehabilitation of Amahoro Stadium in Rwanda. The problem statement underscores the significance of quality management in construction projects, particularly in developing countries like Rwanda, where effective project management is crucial for achieving desired outcomes. Despite the increasing emphasis on TQM in various sectors, there remains limited empirical evidence regarding the direct impact of TQM practices on the success of construction projects in Rwanda. This gap necessitated the investigation of how various TQM dimensions such as quality planning, assurance, control, communication, collaboration, and continuous improvement affect project outcomes and success. The study employed a descriptive survey research design, targeting 144 stakeholders, including project managers, engineers, contractors, and relevant personnel, to gather data through structured questionnaires. Statistical analysis, including regression analysis, was used to assess the relationships between TQM practices and project success. The model summary revealed that the combined quality management practices explained approximately 97.9% of the variance in project success, as indicated by the R-square value of 0.979. This suggests that the TQM practices analyzed had a strong predictive capability in determining the success of the Amahoro Stadium rehabilitation project. The regression analysis results, presented in the coefficients table, further clarified the individual contributions of each TQM dimension. Quality planning showed a significant positive effect on project success, with an unstandardized coefficient of 0.539 and a significance level of 0.041, suggesting its critical role in setting clear project objectives and standards. Quality assurance practices had a substantial impact, with an unstandardized coefficient of 0.733 ($p = 0.010$), highlighting the importance of ensuring compliance with quality standards to reduce defects. Quality control practices also proved significant, with an unstandardized coefficient of 0.514 ($p = 0.002$), underlining the importance of maintaining high standards through regular inspections and corrective actions. Communication and collaboration practices had the highest unstandardized coefficient of 0.625 ($p = 0.036$), emphasizing the critical role of clear communication and stakeholder engagement in ensuring project success. The study's findings reveal that all TQM practices such as planning, assurance, control, and communication positively influence project success. The results strongly support the hypothesis that integrating comprehensive TQM practices in construction projects significantly enhances their chances of success. The findings also suggest that a robust quality management framework, which includes effective training, stakeholder involvement, and continuous improvement, is essential for optimizing project outcomes and achieving stakeholder satisfaction in future projects. In conclusion, this study contributes valuable insights into the role of TQM practices in the successful completion of construction projects in

Rwanda, specifically in the context of the Amahoro Stadium rehabilitation. The strong correlation between TQM dimensions and project success underscores the need for integrating quality management strategies to enhance project performance, reduce risks, and improve overall outcomes in the construction sector.

Key words: Total Quality Management, Project Success, Quality Planning, Quality Assurance, Amahoro Stadium.

DEFINITION OF KEY TERMS OF THE STUDY

Total Quality Management is a holistic approach focused on improving the quality of an organization's outputs by incorporating continuous feedback, comprehensive quality control, and the engagement of all employees in the improvement process.

Quality Planning is the process of identifying the quality standards relevant to the project and determining how to satisfy them. It involves defining the required quality, identifying quality objectives, and planning the processes necessary to achieve the desired quality.

Quality Assurance involves systematic activities and processes aimed at ensuring that the quality requirements for a product or service were fulfilled. It focuses on providing confidence that quality standards and procedures are being followed and that the project will meet its specified requirements.

Quality Control is the process of monitoring and measuring specific project results to ensure they meet the relevant quality standards. It involves identifying defects and implementing corrective actions to address any deviations from the quality requirements.

Communication and Collaboration refer to the processes and practices that ensure effective information exchange and teamwork among all stakeholders in a project. Effective communication and collaboration facilitate coordination, problem-solving, and decision-making, contributing to project success.

Continuous Improvement is an ongoing effort to enhance products, services, or processes. This concept involves regularly evaluating and improving project activities, practices, and outcomes to achieve higher efficiency, effectiveness, and quality over time.

Project Quality refers to the degree to which the project meets the predefined quality standards and specifications. It is a measure of how well the project's deliverables fulfil the requirements and expectations of stakeholders.

Project Timeliness is the measure of how well the project adheres to its schedule and timelines. It assesses whether the project activities and deliverables are completed within the planned time frame.

Project Budget Adherence is the measure of the extent to which the project remains within its allocated budget. It involves managing costs effectively to ensure that the project does not exceed its financial resources.

CHAPTER ONE

INTRODUCTION

1.1 Introduction and Background

This research study highlights the analysis of the total quality management in construction project success impacting projects success. This chapter entails the Background of the study, Statement of the problem, General objective, Specific objectives, hypotheses of the research, scope of the study and the significance of the study.

The BS ISO 10006:1997 defines a project as: "a unique process consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including constraints of time, cost and resources" (ISO, 1997). Projects play key roles in most modern industries, firms, and societal development. Project management practices attempt completion of the project as intended; getting it done most efficiently by minimizing cost and achieving external goals related to customer needs (Kerzner, 2017).

The management of these economic activities, (project management), is continuously developed and today considered to be at the center of competitive advantage (Oakland, 2014). With many constraints in the field of project management and the ever-growing quest to improve methods, tools, and techniques in assuring that projects are adequately delivered, there have been many modifications and integrations made to project management (PMI, 2021). For the purpose of our study, the integration of Total Quality Management into project management, with specific interest in its impact on construction projects specifically the Amahoro stadium rehabilitation project in Kigali Rwanda, was the focus of this work.

Total Quality Management (TQM) is a comprehensive management approach that focuses on long-term success through customer satisfaction. It involves all members of an organization in improving processes, products, services, and the culture in which they work. In the context of construction projects, TQM is particularly crucial due to the complexity, scale, and stakeholder diversity involved in such projects. Effective TQM integration can lead to enhanced project performance, reduced costs, increased client satisfaction, and improved safety and environmental standards.

Implementing TQM in construction projects is important for several reasons. First, it ensures that projects adhere to the highest quality standards, minimizing defects and rework. Second, it focuses on meeting or exceeding client expectations, which is essential for customer satisfaction. Third, TQM practices can lead to significant cost savings by reducing waste, improving efficiency, and preventing costly mistakes. Fourth, a systematic approach to quality management helps in identifying and mitigating risks early in the project lifecycle. Lastly, TQM involves all employees in quality initiatives, fostering a culture of continuous improvement and accountability.

In project management, the triple constraints of time, cost, and quality are pivotal in determining project success. Time management involves ensuring that project activities are completed within the scheduled timeframe, which is critical for meeting deadlines and avoiding costly delays (PMI, 2021). Cost management focuses on planning and controlling the project budget to avoid overruns, ensuring that the project is completed within the approved financial resources (Kerzner, 2017). Quality management ensures that the project's deliverables meet the required standards and satisfy stakeholder expectations, often through rigorous quality assurance and control processes (Oakland, 2014). Balancing these three constraints is essential, as prioritizing one often impacts the others, requiring project managers to skilfully negotiate trade-offs to achieve overall project objectives (Atkinson, 2018). Effective management of time, cost, and quality is thus integral to successful project success and organizational competitiveness.

Stadium renovations across Africa, recently in countries like South Africa, Morocco, and Kenya, are pivotal to enhancing sports infrastructure, meeting international standards, and hosting significant events. These renovations are closely tied to principles of Total Quality Management (TQM), which emphasizes continuous improvement, customer satisfaction, and the involvement of all stakeholders. Total Quality Management (TQM) is a comprehensive management approach that focuses on long-term success through customer satisfaction. In the context of stadium renovations, TQM involves meticulous planning, design, implementation, and continuous improvement to meet and exceed international standards. Key components of TQM, such as stakeholder involvement, process optimization, and quality control, are crucial in managing these large-scale projects.

In South Africa, TQM principles have been applied in the renovation of several stadiums post the 2010 FIFA World Cup to maintain their standards and functionality. For instance, the

Moses Mabhida Stadium in Durban and Soccer City in Johannesburg have undergone periodic upgrades to enhance safety, accessibility, and spectator experience (Jones, 2023; Madichie et al., 2023; Madichie, 2011). South Africa has faced similar issues, particularly with maintaining and upgrading stadiums built for the 2010 FIFA World Cup. The ongoing maintenance requires substantial investment, and managing these costs while ensuring the stadiums remain in top condition is a constant challenge (Smith, 2022).

Morocco's Mohammed V Stadium in Casablanca and the Prince Moulay Abdellah Stadium in Rabat have also seen significant upgrades, incorporating TQM principles. These renovations include modern seating, improved drainage systems, and enhanced safety features, which align with TQM's focus on quality and customer satisfaction (Sport Africa, 2023). Another significant challenge is maintaining the balance between cost, quality, and time. In Morocco, the renovation projects had to navigate budget constraints while ensuring that the quality of materials and construction met international standards. This often-required re-evaluating project scopes and timelines, which is a critical aspect of TQM's continuous improvement process (Sport Africa, 2023).

Kenya's renovation of the Moi International Sports Complex in Kasarani and Nyayo National Stadium in Nairobi underscores the importance of accurate demand forecasting, quality materials, and skilled labour. These aspects are central to TQM, ensuring that the renovated facilities meet the Confederation of African Football (CAF) standards and are sustainable in the long term (Nation) (Pulse Sports Kenya). In Kenya, for example, the renovation of the Nyayo National Stadium faced delays due to bureaucratic hurdles and funding issues. These challenges highlight the need for effective project management and stakeholder coordination, key elements of TQM (Shafic, 2023).

Uganda is actively renovating key stadiums, particularly the Mandela National Stadium in Namboole. This stadium, a centrepiece of Ugandan sports infrastructure, is undergoing upgrades to meet international standards and enhance its capacity to host significant sporting events. The renovations are driven by a need to improve facilities, seating capacity, and overall infrastructure quality. Applying TQM principles, the focus is on customer satisfaction, continuous improvement, and effective process management. These principles ensure that the renovation process is systematic, efficient, and aligned with stakeholders' needs.

However, the project faces significant challenges. Funding issues are a major hurdle, with securing adequate financial resources proving difficult and often leading to delays and scaled-

back improvements. Project management is another critical challenge, as coordinating various aspects of the renovation, including timelines, resources, and labour, requires meticulous planning and execution. Additionally, balancing the needs and expectations of multiple stakeholders, including government bodies, sports organizations, and the public, is crucial for the project's success. To overcome these challenges, Uganda employs risk management strategies, stakeholder engagement, and robust quality control systems to ensure the successful renovation of the Mandela National Stadium (Garcia, 2022; Madichie, 2011).

In Tanzania, significant renovations are underway at the National Stadium in Dar es Salaam and the Benjamin Mkapa Stadium. These projects aim to upgrade the facilities to meet international standards, providing better amenities for athletes and spectators alike. The application of TQM principles ensures that the renovations focus on quality improvement, customer satisfaction, and efficient process management, crucial for the success of such large-scale projects. By emphasizing continuous improvement and involving all stakeholders in the process, these principles help maintain high standards throughout the renovation (Chen et al., 2020).

Despite these efforts, the projects face numerous challenges. Ensuring the use of high-quality materials and maintaining high standards of workmanship throughout the renovation process is essential but challenging. Incorporating modern technologies, such as advanced lighting systems, seating arrangements, and turf management, is necessary to meet international standards but can be technically and logistically demanding. Additionally, adhering to both local and international building codes and standards is a critical aspect of the renovation process. To address these challenges, Tanzania utilizes lean construction principles, comprehensive quality control systems, and effective stakeholder engagement to ensure the successful completion of stadium renovations (Chen et al., 2020).

The construction industry in Rwanda has experienced significant growth due to government infrastructure projects and private sector investments, emphasizing the importance of project management. Despite this growth, challenges such as project delays, budget overruns, and quality control issues are prevalent. Integrating TQM practices in project management can address these issues by fostering a systematic approach to quality improvement and process optimization. TQM ensures that construction projects are delivered on time, within budget, and to the required quality standards, thereby enhancing the overall performance and competitiveness of the construction industry in Rwanda.

Rwanda's Amahoro National Stadium renovation construction project in Kigali was the focal point of this dissertation. The project although already completed is a proper model for analysing total quality management integration in construction project success. The project is widely seen as one of the successful construction projects in the sub-region integrating total quality management method. The success of this project is attributed to various factors. First, it went well and met its projected goal and objectives which was to meet FIFA and World Athletic Federation standards. The renovation project aims to expand the seating capacity from 25,000 to 45,000 and upgrade facilities such as the VVIP sections, lounges, and media areas.

Through expansion and upgrade this project met TQM principles by meeting both customers (fans) and stakeholders (FIFA, MINISPORT & and FERWAFA) expectations. Second, the ambitious project went well was the application of TQM principles to ensure quality, continuous improvement, effective process management, and high customer satisfaction. By focusing on these principles, the renovation aimed to create a world-class facility that can host international events and serve local needs effectively (Lonard, 2014) and also enabled the project to be delivered on time and even ahead of schedule.

Taking into consideration the success of this project couple with proper integration of TQM principles leading to its success, the Amahoro stadium renovation project provides a perfect basis to write my dissertation entitled "Analyses of TQM integration in construction project success'. The project, however, encounters several challenges. Managing the logistics of material delivery and construction schedules poses a significant challenge, especially given the scale of the renovations. Ensuring the project stays within budget while maintaining high-quality standards is another critical issue, requiring careful financial management. Additionally, implementing sustainable practices to minimize the environmental footprint of the renovations is crucial, given the increasing importance of environmental considerations in construction projects (Tuyizere, 2023). Rwanda addresses these challenges through comprehensive project management practices, sustainability initiatives, and effective risk management strategies to ensure the successful renovation of the Amahoro National Stadium (see Madichie et al. 2023).

1.2. Problem statement

Total Quality Management (TQM) is recognized globally as a critical framework for enhancing the success of construction projects by ensuring adherence to quality standards, timelines, and budgets. In Rwanda, where infrastructure development is a cornerstone of economic growth,

TQM integration is essential to achieve project excellence. Despite its importance, the implementation of TQM in Rwanda's construction sector has been inconsistent, leading to significant project failures. Poor TQM practices have resulted in delays, cost overruns, and substandard project outcomes, which jeopardize the country's development goals (Gasana, 2022).

Empirical evidence highlights the alarming rate of project failures attributed to poor TQM practices in Rwanda. For instance, the Bugesera International Airport project experienced a 36% cost overrun and two years of delays due to inadequate quality control and mismanagement of resources (Rwanda Transport Authority, 2023). Similarly, the Kigali Convention Center, initially projected to be completed in 2015, faced a three-year delay and a 28% increase in costs, primarily due to design flaws, poor stakeholder collaboration, and inconsistent quality assurance mechanisms (Rusanganwa, 2022). These projects underscore the critical gaps in TQM implementation and its detrimental impact on project timelines and budgets.

In the road construction sector, the Musanze-Kigali Road project serves as a prime example of TQM deficiencies. The project suffered from premature pavement deterioration within 18 months of completion, uneven road surfaces, and inadequate drainage systems, leading to increased maintenance costs and heightened safety risks. Reports estimate that over 42% of completed road projects in Rwanda experience structural issues within the first two years, with poor quality management identified as a primary cause (Rwanda Infrastructure Report, 2023).

The rehabilitation of the Amahoro Stadium, a flagship project for Rwanda's sports infrastructure, also illustrates the consequences of poor TQM practices. Delays in material delivery, insufficient quality monitoring, and lack of stakeholder involvement have contributed to the project's inability to meet its initial completion timelines and quality standards (Tuyizere, 2023). The project has faced a 24-month delay and incurred an additional 18% in unforeseen costs, further reflecting systemic issues in TQM implementation.

Despite global evidence of TQM's benefits, Rwanda's construction sector continues to face persistent challenges due to poor quality management practices. A study by Mpofu et al. (2020) in South Africa demonstrated how effective resource allocation, stakeholder collaboration, and quality control mechanisms are integral to successful project completion. However, similar practices are not fully realized in Rwanda. The absence of Rwanda-specific research addressing these gaps exacerbates the challenges, leaving the sector ill-equipped to implement effective TQM strategies tailored to local needs.

This study seeks to bridge the gap by examining the integration of TQM principles in Rwanda's construction industry, with a focus on the Amahoro Stadium project. By investigating factors such as resource allocation, stakeholder collaboration, and quality control practices, the research aims to identify actionable strategies to improve TQM adoption. Addressing these issues is crucial for ensuring that Rwanda's infrastructure projects meet international standards of quality, sustainability, and economic efficiency.

1.3. General objective of the study

The aim of the study is to assess the total quality management and project success. A case study Amahoro stadium, Rwanda.

1.3.1. Specific objective of the study

The study was guided by the following objectives:

i. To analyse the effect of quality planning practices on Amahoro Stadium construction success,

ii. To assess the effect of quality assurance practices on Amahoro Stadium construction success,

iii. To investigate the effect quality control practices on the Amahoro Stadium construction success,

iv. To evaluate the effect of communication and collaboration practices on Amahoro Stadium construction success.

1.4. Research questions

To attain the objectives of the study, the research will answer the following questions:

i. What is the effect of quality planning practices on Amahoro Stadium construction success?

ii. What is the effect of quality assurance practices on Amahoro Stadium construction success?

iii. What is the effect quality control practices on the Amahoro Stadium construction success?

iv. How do communication and collaboration practices effect construction success?

1.5. Hypotheses of the study

The research tested the following hypotheses:

$H_0$1: There is no significant effect of quality planning practices on Amahoro Stadium construction success,

$H_0$2: There is no significant effect of quality assurance practices on Amahoro Stadium construction success,

$H_0$3: There is no significant effect of quality control practices on Amahoro Stadium construction success,

$H_0$4: There is no significant effect of communication and assurance practices on Amahoro Stadium construction success.

1.6. Significance of the study

This study aims to analyse total quality management in construction projects. Beneficiary of the study are as follows:

1.6.1. The researcher

The study on Total quality management and project success holds profound significance for the researcher within the domain of project management. It offers a unique opportunity to advance the existing body of knowledge in construction management and TQM practices, emphasizing project management strategies. By investigating the specific challenges and successes witnessed in the Rwandan context, the researcher aims to generate fresh insights and practical recommendations applicable to similar projects in developing countries. This research endeavour not only enriches understanding but also strengthens the researcher's expertise and credibility in construction quality management within project management, paving the way for enhanced academic contributions and professional growth opportunities.

1.6.2. To University of Kigali

For the University of Kigali, this study on Total quality management and success Amahoro stadium project hold substantial value in several effectful ways. Firstly, it enriches the university's research portfolio by adding a relevant and contemporary study that addresses pressing issues in Rwanda's infrastructure development and project management. The findings and methodologies employed serves as a valuable reference for future academic endeavours, including theses and dissertations by students.

Additionally, this research supports the university's mission to contribute to national development through high-quality, effectful research initiatives. The insights gained from this study will also play a crucial role in informing the university's curriculum, particularly in

ensuring that students are equipped with knowledge of cutting-edge practices and real-world challenges in project management and TQM. This alignment with current industry practices better prepare graduates to meet the evolving needs of Rwanda's project management.

1.6.3. To government of Rwanda

The study on Total quality management and success Amahoro stadium project holds significant implications for the Government of Rwanda, particularly within the realm of project management. It offers evidence-based recommendations aimed at enhancing the quality and efficiency of construction projects through robust TQM practices. Given the government's prioritization of infrastructure development as a catalyst for economic growth, the insights derived from this research can directly inform policy decisions and strategic planning processes in project management.

By identifying best practices and potential pitfalls in project management, the findings facilitate more effective resource allocation and implementation of quality control measures across governmental construction initiatives. Furthermore, the study addresses specific challenges such as resource constraints and stakeholder engagement, aligning with the government's broader objectives of sustainable development and poverty reduction within the framework of project management strategies.

1.7. Scope of the study

The research was limited in content scope, time scope and geographical scope.

1.7.1. Content scope

The study focuses on Total Quality Management (TQM) principles and their integration into construction project success processes. It encompasses an examination of various TQM practices, including quality planning, quality control, quality assurance, and continuous improvement, within the context of construction projects. Specifically, the research will explore how TQM principles can be applied to enhance the quality, efficiency, and effectiveness of construction project success, with a particular emphasis on the rehabilitation of Amahoro Stadium in Rwanda.

1.7.2. Geographical scope

The geographical scope of the study is Gasabo district, Remera sector, located in Rwanda. Gasabo district is home to Amahoro Stadium, a significant infrastructure asset in the country.

The study will focus on the rehabilitation project of Amahoro Stadium, situated within the Remera sector. By concentrating on a specific geographical location, the research aims to provide a detailed analysis of TQM integration in construction project success within a defined area, thereby facilitating a comprehensive understanding of the local context and challenges.

1.7.3. Time scope

The study coverd the period 2023, encompassing recent developments and trends in TQM practices and construction project success. This time frame allows for the examination of past initiatives related to TQM implementation in construction projects, providing valuable insights into evolving strategies and approaches over the specified period. By considering developments up to 2023, the research ensures relevance and currency in addressing contemporary issues and challenges in the field of construction management and quality assurance.

CHAPTER TWO

LITERATURE REVIEW

2.0. Introduction

This chapter reviews the concepts relate to the total quality management and project success, the theories and empirical review, the gap analysis and ends with the conceptual framework that presents the variables of the study.

2.1. Conceptual review

Total Quality Management (TQM) is a comprehensive management philosophy and approach that emphasizes continuous improvement, customer focus, and employee involvement to enhance organizational performance and competitiveness (Dale et al., 2019). It originated in the manufacturing sector but has since been widely adopted across various industries, including services, healthcare, and construction, due to its effectiveness in improving quality, efficiency, and customer satisfaction (Kanji, 2020).

2.1.1. Quality planning

Quality planning holds significant importance in the successful delivery of construction projects, particularly when integrating Total Quality Management (TQM) principles. It involves systematically identifying quality requirements, standards, and objectives to ensure that products or services meet or exceed customer expectations. Within the construction

industry, quality planning plays a crucial role in defining project goals, specifications, and performance criteria to achieve desired outcomes efficiently and effectively (Oakland, 2019).

The principles of quality planning emphasize customer focus, clear objectives and specifications, risk management, and continuous improvement. Customer focus ensures alignment with end-user needs, while clear objectives and specifications establish common understanding among stakeholders. Proactive risk management anticipates and mitigates potential issues, and continuous improvement fosters ongoing enhancement of project processes and outcomes (Abdul-Rahman & Berawi, 2021).

In the context of the study on Total Quality Management integration in construction project success in Rwanda, quality planning serves as a cornerstone for achieving project success and delivering high-quality infrastructure such as the rehabilitation of the Amahoro Stadium. By conducting comprehensive quality planning processes, the project team can establish clear quality objectives, define performance standards, and identify critical success factors specific to the project and the Rwandan context (Mukhtar et al., 2020).

Quality planning contributes significantly to addressing challenges and ensuring the success of construction projects in Rwanda. By incorporating quality planning principles into TQM integration initiatives, projects such as the Amahoro Stadium rehabilitation can achieve excellence in quality, efficiency, and stakeholder satisfaction. This approach ensures that construction projects in Rwanda meet international standards while also considering local needs and requirements (Ahadzie et al., 2019).

The significance of quality planning extends beyond individual projects to the broader development goals of Rwanda. By delivering high-quality infrastructure, construction projects contribute to economic growth, social development, and environmental sustainability. Therefore, integrating quality planning into construction project success aligns with the priorities of the Rwandan government and supports its efforts towards sustainable development and national prosperity (Assaf & Al-Hejji, 2020).

In conclusion, quality planning is a vital process in construction project success, enabling project teams to proactively address quality-related challenges, mitigate risks, and ensure project success. By incorporating quality planning principles into Total Quality Management integration initiatives, construction projects in Rwanda, such as the Amahoro Stadium rehabilitation, can achieve excellence in quality, efficiency, and stakeholder satisfaction. This

approach supports Rwanda's development goals and contributes to the country's economic and social progress (Baldwin et al., 2020).

2.1.2. Quality assurance

Quality assurance (QA) in construction projects is a fundamental aspect of ensuring that projects meet predefined quality standards and requirements. It involves systematic processes and activities aimed at preventing defects, identifying non-conformities, and continuously improving project outcomes. QA encompasses various measures, including quality planning, quality control, and quality improvement initiatives, all aimed at achieving and maintaining high standards of quality throughout the project lifecycle (Abdul-Rahman & Berawi, 2021).

The concept of quality assurance is rooted in the principles of Total Quality Management (TQM), which emphasize the importance of a proactive approach to quality management. In construction projects, QA begins with quality planning, where project objectives, specifications, and performance criteria are established to guide project activities. Quality control activities are then implemented to monitor and evaluate project performance against these predefined standards, ensuring that defects and deviations are identified and addressed promptly (Assaf & Al-Hejji, 2020).

The integration of QA practices into construction project success is essential for achieving project success and meeting stakeholder expectations. By implementing robust QA processes, project teams can enhance project quality, reduce rework and defects, and improve overall project efficiency and effectiveness. This, in turn, leads to greater customer satisfaction, improved project outcomes, and enhanced reputation for project stakeholders (Ahadzie et al., 2019).

In the context of the study on Total Quality Management integration in construction project success in Rwanda, quality assurance plays a crucial role in ensuring the successful rehabilitation of the Amahoro Stadium. By implementing QA measures such as quality planning, control, and improvement, the project team can ensure that the stadium rehabilitation meets international quality standards and aligns with the expectations of stakeholders and end-users (Mukhtar et al., 2020).

The significance of quality assurance extends beyond individual projects to the broader construction industry in Rwanda. By promoting a culture of quality and excellence, QA initiatives contribute to raising industry standards, enhancing competitiveness, and driving

sustainable growth and development. Additionally, QA practices support the Rwandan government's vision for infrastructure development and economic transformation, aligning with its goals for national development and prosperity (Baldwin et al., 2020).

Overall, quality assurance is a critical component of construction project success, ensuring that projects meet predefined quality standards and requirements. By integrating QA practices into Total Quality Management initiatives, construction projects in Rwanda, such as the rehabilitation of the Amahoro Stadium, can achieve and maintain high standards of quality, efficiency, and stakeholder satisfaction. This supports Rwanda's development goals and contributes to the country's economic and social progress (Abdul-Rahman & Berawi, 2021).

2.1.3. Quality control

Quality control (QC) in construction projects is a systematic process aimed at ensuring that project outputs meet specified quality standards and requirements. It involves the implementation of measures and procedures to detect and correct defects, errors, or deviations from established quality criteria throughout the construction process. QC activities are essential for verifying that work is performed according to project specifications, plans, and applicable regulations, ultimately leading to the delivery of high-quality construction projects (Assaf & Al-Hejji, 2020).

The concept of quality control is an integral part of Total Quality Management (TQM) principles, which emphasize the importance of continuous improvement and customer satisfaction. In construction, QC activities typically include inspections, testing, and monitoring of materials, workmanship, and project processes to identify any issues or non-conformities that may arise during construction (Abdul-Rahman & Berawi, 2021).

The implementation of effective quality control measures is critical for achieving project success and mitigating risks in construction projects. By conducting regular inspections and tests, project teams can identify and address quality issues promptly, preventing costly rework, delays, and disputes later in the project lifecycle. Moreover, QC activities help ensure that projects meet safety, performance, and regulatory requirements, reducing the likelihood of accidents, defects, and legal liabilities (Ahadzie et al., 2019).

In the context of the study on TQM integration in construction project success in Rwanda, quality control plays a vital role in ensuring the successful rehabilitation of the Amahoro

Stadium. Through rigorous QC measures, such as on-site inspections, material testing, and quality audits, the project team can verify compliance with project specifications and standards, ensuring that the renovated stadium meets quality and safety requirements (Mukhtar et al., 2020).

The significance of quality control extends beyond individual projects to the construction industry as a whole in Rwanda. By implementing robust QC processes and fostering a culture of quality, the construction sector can enhance its reputation, attract investment, and drive sustainable growth and development. Moreover, QC initiatives support Rwanda's national development agenda by ensuring the delivery of infrastructure projects that meet the needs and expectations of citizens and contribute to the country's socio-economic progress (Baldwin et al., 2020).

Overall, quality control is a critical aspect of construction project success, ensuring that projects meet specified quality standards and requirements. By integrating QC measures into Total Quality Management frameworks, construction projects in Rwanda, such as the rehabilitation of the Amahoro Stadium, can achieve and maintain high levels of quality, safety, and stakeholder satisfaction. This contributes to Rwanda's development goals and advances the country's construction industry towards excellence and sustainability (Assaf & Al-Hejji, 2020).

2.1.4. Communication and Collaboration

In the context of Total Quality Management (TQM) integration in construction project success in Rwanda, communication and collaboration play pivotal roles in ensuring project success and achieving desired quality outcomes. Examining the contributions of communication and collaboration to the study, particularly within the framework of the Amahoro Stadium rehabilitation project, reveals their significance in enhancing TQM practices and overall project performance.

Effective communication mechanisms facilitate the dissemination of project requirements, specifications, and quality standards to all project stakeholders involved in the Amahoro Stadium rehabilitation project. Clear and transparent communication channels, as highlighted by Koo, Lee, and Wu (2021), enable project teams to align their efforts with TQM principles, ensuring a common understanding of quality objectives and expectations. By fostering open communication among project participants, potential misunderstandings or discrepancies regarding quality standards can be mitigated, thereby promoting adherence to TQM principles throughout the project lifecycle.

Moreover, collaboration among various stakeholders involved in the Amahoro Stadium project is essential for integrating TQM practices into construction project success. As emphasized by Love, Zhou, and Edwards (2019), collaboration fosters teamwork and cooperation among project participants, enabling them to collectively identify quality improvement opportunities and address potential challenges. By promoting a collaborative environment, the project team can leverage diverse perspectives and expertise to implement TQM initiatives effectively, ultimately enhancing project quality and performance.

The contribution of communication and collaboration to the study extends beyond mere facilitation; it serves as a catalyst for TQM integration within the Amahoro Stadium rehabilitation project. Olanipekun, Afolabi, and Ede (2020) advocate for the development of communication and collaboration frameworks tailored to the specific needs of construction projects, emphasizing their role in promoting TQM principles such as continuous improvement and customer focus. Through effective communication and collaboration, project teams can proactively address quality issues, solicit feedback from stakeholders, and implement corrective measures to ensure that project objectives are met within the stipulated quality parameters.

In the Rwandan context, where infrastructure development projects like the Amahoro Stadium rehabilitation are crucial for national progress, the integration of TQM practices facilitated by robust communication and collaboration processes is imperative. Rahman and Azam (2021) highlight the importance of cultural sensitivity and effective communication strategies, particularly in diverse project environments. By promoting cultural awareness and fostering inclusive communication practices, the Amahoro Stadium project team can overcome potential communication barriers and leverage the strengths of its multicultural workforce to drive TQM integration and project success.

Ultimately, communication and collaboration serve as foundational elements for integrating TQM principles into construction project success, particularly in the context of the Amahoro Stadium rehabilitation project in Rwanda. Their contributions extend beyond mere facilitation, playing a transformative role in promoting TQM practices, enhancing project quality, and ultimately contributing to the successful delivery of infrastructure projects crucial for national development.

2.1.5. Project success

Project quality is a critical variable in project success, representing the degree to which project deliverables meet specified requirements and standards. Research by Jones and Love (2019) emphasizes the importance of project quality in achieving project success and customer satisfaction. By focusing on quality planning, assurance, and control processes, organizations can ensure that project work meets or exceeds quality expectations, thereby enhancing project outcomes and stakeholder confidence (Smith & Reinertsen, 2020). The contribution of project quality to the study lies in its effect on overall project success, as higher project quality is associated with reduced rework, lower costs, and increased customer satisfaction (Pinto & Prescott, 2021).

Project timeliness refers to the ability of a project to be completed within the scheduled timeframe. Studies by Turner and Cochrane (2021) highlight the significance of project timeliness in meeting stakeholder expectations and achieving project objectives. Timely project success is crucial for maintaining project momentum, avoiding schedule delays, and minimizing disruptions to project stakeholders (Kerzner & Saladis, 2022). By implementing effective schedule management processes and monitoring project progress closely, organizations can enhance project timeliness and increase the likelihood of project success (Project Management Institute, 2023). The contribution of project timeliness to the study lies in its effect on project outcomes, as projects delivered on time are more likely to meet stakeholder needs and achieve desired outcomes (Schwalbe, 2019).

Project budget adherence involves managing project costs within the allocated budget. Research by Meredith and Mantel (2020) underscores the importance of budget adherence in ensuring project viability and financial sustainability. Effective cost management practices, such as budget planning, monitoring, and control, are essential for preventing cost overruns, maximizing resource utilization, and optimizing project performance (Pinto & Kharbanda, 2022). By adhering to budget constraints, organizations can minimize financial risks, maintain stakeholder confidence, and achieve project objectives within budgetary constraints (Project Management Institute, 2021). The contribution of project budget adherence to the study lies in its effect on project success, as projects that stay within budget are more likely to be considered successful and sustainable (Kendrick, 2018).

Client satisfaction is a key variable in project success, representing the extent to which project deliverables meet or exceed client expectations. Research by Shenhar and Dvir (2020)

highlights the significance of client satisfaction in building long-term relationships and securing future business opportunities. By focusing on client needs and preferences, organizations can enhance client satisfaction, improve project outcomes, and foster positive word-of-mouth referrals (Pinto & Cabanis-Brewin, 2021). Effective communication, stakeholder engagement, and quality management practices are essential for understanding and addressing client expectations throughout the project lifecycle (Project Management Institute, 2023). The contribution of client satisfaction to the study lies in its effect on project success, as satisfied clients are more likely to endorse the project, contribute positively to project outcomes, and facilitate organizational growth and success (Cleland & Ireland, 2017).

Project success represents the achievement of project objectives within the constraints of time, cost, scope, and quality. Research by Morris and Pinto (2019) highlights the multidimensional nature of project success, encompassing factors such as stakeholder satisfaction, deliverable quality, and organizational effect. By considering variables such as project quality, timeliness, budget adherence, and client satisfaction, organizations can assess project success holistically and identify opportunities for improvement (Cooke-Davies, 2022). The contribution of project success to the study lies in its role as the ultimate goal of project success, reflecting the extent to which project objectives are achieved and stakeholder needs are met (Turner, 2019).

2.2. Theoretical review

A theoretical framework is important to a researcher because it helps in limiting the scope of data relevant to the study by focusing on specific variables and viewpoint. Cherry (2015) defines a theory as a fixed principle that has been developed to elucidate some characteristic of the natural world. A theoretical framework should reveal an understanding of theories and concepts that are relevant to the research topic (Labaree, 2013). The theoretical review for this study was based on the relevant theories that explain project performance in public institution such as resource-based theory, public Choice Theory, agency Theory and the theory of Work Adjustment (TWA).

2.2.1. Principal-Agency Theory

An agency relationship is a contract under which one or more persons (principals) engages another person (the agent) to perform some service on their behalf which involves delegating some decision-making authority to the agent" (Jensen, 1976). Caers *et al.* (2006) described the assumption of principal-agent relationships as one that will always be characterized with

conflict between the principals‟ interests and that of the agent; and the agent is interested in pursuing his or her own goals.

Agency relations are all contractual arrangements, for instance between an employer and employee or the state and the governed, lawyer and the client, buyer and supplier and others. (Eisenhardt, 1989). This study focuses on the agency relationship which arises between procurement entities and elected representatives of the government. The public through the elected members of parliament are the principals on behalf of citizens, whereas the Metropolitan Municipal District Assemblies officials (heads of procurement entities, procurement officers, planning officers, engineers and heads of departments) are the agents.

Agency costs refer to "the sum of the costs of structuring, bonding, and monitoring contracts between agents" (Jensen, 2022, p. 21). Agency relationships come with both monitoring and bonding costs for both the principal and the agent this can be both monetary and non-monetary (Meckling, 1979). There is some divergence between the principals‟ and the agents' decisions (Jensen and Meckling, 1979). To limit or curb this divergence from the principals‟ interest his interest, the principal makes provision incentives for the agent or putting in monitoring systems thereby incurring costs in an attempt to limit the agents‟ activities (Jensen and Meckling, 1979). In other cases, the agent will incur bonding cost in order to guarantee the principal that he will take actions or make decisions that will not be at the detriment of the principals' interest (Meckling, 1979).

The relevance of Principal-Agent Theory to this study is multifaceted. First, it aids in uncovering what motivates different stakeholders in the TQM process, enabling the design of better incentive systems for agents to align their actions with the project goals. Second, it provides a framework for developing effective monitoring systems that can help ensure compliance with TQM practices, ultimately leading to improved quality and project outcomes. Additionally, understanding agency costs allows the study to propose strategies to minimize these costs while maximizing efficiency and effectiveness in TQM implementation. Lastly, the application of Principal-Agent Theory can enhance transparency and accountability in the project management process, which is crucial for public construction projects like Amahoro Stadium.

In the context of the Amahoro Stadium construction, Principal-Agent Theory has contributed significantly by elucidating the dynamics between government representatives (principals) and procurement officials (agents), highlighting the inherent conflicts of interest that can arise

between their goals. This theory helps to identify the motivations of different stakeholders involved in the Total Quality Management (TQM) process, enabling the design of better incentive systems that align agent actions with project objectives. It also provides a framework for developing effective monitoring systems that ensure compliance with TQM practices, ultimately leading to improved quality and project outcomes.

By understanding agency costs, the study can propose strategies to minimize these costs while maximizing efficiency and effectiveness in TQM implementation. Additionally, the application of Principal-Agent Theory enhances transparency and accountability in the project management process, which is crucial for public construction projects like Amahoro Stadium, ensuring that agents act in the best interest of the citizens they represent. Overall, this theory offers valuable insights into the relationships and incentives at play in TQM implementation, essential for assessing and improving project success.

2.2.2. Resource-based theory

To comprehend how any organizations, attain viable competitive advantage the resource-based concept has been advanced. For an organization to compete in the global market there is the need to develop new technologies together with new business strategies. The best understanding of the new ways to implement and adopt new technologies such as information technology is necessary due to their short life cycle which leads to changing cost increase of using the Information Technology (Bridge et al. 1998). Basing the argument on resource-based philosophy, the competitive advantage only develops in a resource heterogeneity condition (diverse resources across companies) and immovability of resources (the inability of rival organizations to acquire resources from other firms) (Barney, 2022).

As clarified by Grover et al. (1998) "The centre of the asset-based idea is that given asset satisfaction and fixed status of the need of blemished unchanging nature and asset heterogeneity, non-substitutability, esteem and rareness. Organizations' assets can be a premise of preceded with upper hand". Undertakings are dealt with as potential makers of significant worth included capacities by the asset-based hypothesis as found in the investigation. Understanding this advancement of such skills and abilities will include seeing the assets, the advantages of the firm in connection to learning based point of view (Hamel and Prahalad, 2013).

They attentively focused on the consolidated learning procedures of the business, on the aptitude’s improvement and innovation mix. "Centre abilities" is their idea which is identified

with components by which firms create business capacities to beat contenders through learning and aggregating new aptitudes. One of the objective objectives of the rationality to assess and help supervisors to perceive why aptitudes can be seen as an organization's most refreshing quality and, correspondingly, progress of corporate execution is acknowledged when these benefits are used. Comprehension of this hypothesis in association acknowledges that qualities identified with going before institutional culture, encounters and capacities are basic and vital to the accomplishment of the firm.

Conner (2022) claims that "there is a likelihood to deliver abilities in an in-house group, specialized learning or schedule that suits best with current exercises inside the firm." Mata et al. (1995) in a hypothetical report watching Data Innovation five qualities (buyer exchanging costs, restrictive innovation, administrative and in addition specialized Data Innovation aptitudes and access to capital) discovered that official IT abilities are the just a single of these highlights that can offer a legitimate upper hand.

In the context of the study on Total Quality Management (TQM) and project success at Amahoro Stadium in Rwanda, RBT is particularly relevant. It emphasizes the importance of leveraging the unique resources and capabilities within the construction project to ensure quality outcomes. By applying RBT, the study will explore how the specific assets and competencies of the project team and stakeholders contribute to the effective implementation of TQM principles, ultimately leading to improved project success. Understanding how to harness these resources was crucial in assessing the effectiveness of TQM integration within the construction process, thereby enhancing the overall quality and sustainability of the project at Amahoro Stadium.

2.3. Empirical review

The section presents the empirical review based on the objectives of the study which are to analyses the effect of quality planning practices on construction project success, to assess the effect of quality assurance practices on construction project success, to find out the effect quality control practices on construction project success and to assess the effect of communication and collaboration practices on construction project success.

2.3.1. Quality planning and construction project success

Cesar et al. (2021) examined quality control planning in residential construction projects in Spain, identifying and classifying common deficiencies in the planning process. The study

focused on the quality control models provided by Professional Associations of Architects and analysed their practical application across various residential projects.

In a separate study, Kubra (2020) explored the influence of project planning processes on construction project success in Nigeria, assessing various planning processes and their impact on project efficiency and effectiveness. The findings highlighted that the Creation of Work Breakdown Structure (WBS), Program Evaluation Review Technique (PERT), Project Schedule Network, and Quality Management Plan were the most utilized planning processes, with WBS being the most significant. Additionally, increased awareness and implementation of project planning processes were found to be essential for enhancing construction project performance, underscoring the necessity for continuous training and development for professionals in the sector. Both studies reinforce the critical role of effective planning whether in quality control or overall project management as a vital factor for success in the construction industry.

2.3.2. Quality assurance and construction project success

Christian (2019) conducted a study analysing quality assurance practices (QAPs) in small and medium-sized real estate-construction projects in the Mopani District Municipality of South Africa. Utilizing a quantitative survey approach, the research involved administering a three-section questionnaire to 160 purposively selected estate-building practitioners within South African construction SMEs. The questionnaire was structured to capture participants' profiles, identify the QAPs implemented in estate-building programs, and highlight factors negatively influencing the implementation of quality assurance processes.

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 23, employing descriptive statistics to determine the reliability of various constructs, mean scores, and standard deviations. The empirical findings revealed eight reliable and valid QAPs that can help control or minimize causes of poor quality in projects undertaken by construction SMEs, including project planning and control techniques, project construction design, process implementation and improvement, financial management, organizational structures, involvement of people, and quality standards and measurements. The researchers advocate for the adoption of these practices to enhance quality assurance in construction projects undertaken by SMEs in South Africa.

2.3.3. Quality control and construction project success

Beliakov (2019) researched the development of a Quality Control System for residential real estate construction, focusing on a process-based approach to enhance quality management processes in investment projects. The study highlighted the need for structural decomposition of processes involved in designing, inspecting, and implementing construction projects. It identified critical areas that cause deviations from project plans and emphasized the importance of minimizing the time needed to detect discrepancies between actual and planned project parameters through the adoption of a process approach.

Similarly, Harry (2020) investigated quality control practices in building construction projects in Ghana. Using a quantitative method, data were collected from a sample of 60 professionals, including project managers, architects, and contractors. The findings revealed key quality control practices, such as management support for long-term improvement plans, prioritization of quality over cost, and regular quality reviews. However, the study also identified obstacles to effective quality control, including lack of management commitment and insufficient worker knowledge about quality importance. Recommendations for enhancing quality management included fostering teamwork, setting shared goals, and addressing quality issues promptly. Both studies emphasize the critical role of effective quality control in successful construction project management.

2.3.4. Continuous improvement and construction project success

Mugero et al. (2021) explored the effects of quality improvement on construction project performance in Trans Nzoia County, Kenya, with a focus on the role of leadership. Utilizing a descriptive survey research design, the study distributed 110 questionnaires to project professionals, receiving 100 completed responses. Data analysis involved cleaning and coding the responses, followed by frequency counts to identify common themes. The results indicated that quality improvement accounts for 25.2% of construction project performance in the region. The study concluded that effective leadership significantly enhances project performance and recommended the integration of leadership into construction policies.

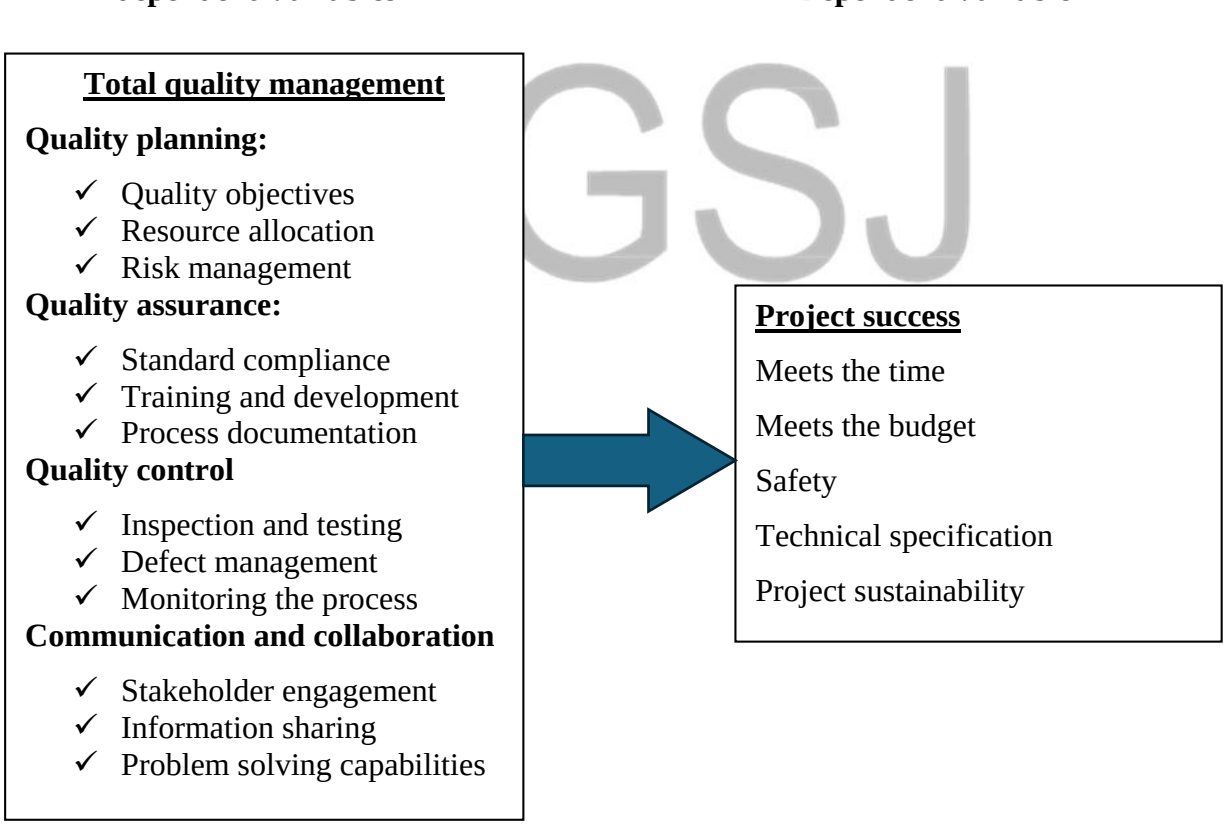
Samuel (2019) investigated the impact of quality improvement on the sustainability of public building projects in Kigali, Rwanda, focusing on 100 first-category buildings. Using a descriptive-comparative survey design, the researcher collected data through questionnaires and interviews. The analysis revealed weak but significant relationships between various factors, including the legal framework, building codes, and project management

methodologies, and the sustainability of construction projects. The study emphasized the need for project managers and engineers to adhere to established standards, adopt appropriate quality control methodologies, and utilize certified materials to ensure the sustainability of public buildings. Furthermore, it recommended that construction managers apply effective project management methodologies throughout the project lifecycle to enhance sustainability outcomes.

2.4. Conceptual framework

The Conceptual framework provides structure and content for the whole study (Vaughan, 2008). Kombo and Tromp (2009), describe a concept as an abstract or broad idea inferred or resulting from definite instances. The independent variables of this study are quality planning, quality assurance, quality control and quality improvement and the dependent variable is project performance as shown in figure 2.1

Figure 2.1: Conceptual Framework: Quality management and project success



Source: Researcher compilation, 2024

The relationship between Total Quality Management (TQM) and project success is founded on the integration and measurement of key variables across quality planning, quality assurance,

quality control, and communication and collaboration. Quality planning ensures that quality objectives, resource allocation, and risk management are aligned to create a robust foundation for achieving project goals. Quality assurance focuses on adherence to standards, effective training and development, and comprehensive process documentation, which promote consistency and reliability.

Quality control emphasizes inspection and testing, defect management, and process monitoring to address issues proactively and maintain project standards. Communication and collaboration, through stakeholder engagement, information sharing, and problem-solving capabilities, ensure alignment and cohesion among project participants. Collectively, these dimensions of TQM enhance project success by ensuring the project meets its time and budget constraints, adheres to safety and technical specifications, and promotes sustainability.

2.5. Research Gap

Empirical studies highlight the importance of quality management practices in construction projects, revealing insights that can inform the integration of these principles in various contexts. Cesar et al. (2021) analyzed quality control planning in residential projects in Spain, focusing on common deficiencies and the role of professional associations. While this study provides valuable insights, its geographical focus and limitation to residential construction leave a gap regarding the applicability of these principles to large-scale infrastructure projects, such as stadium construction in Rwanda. Similarly, Kubra (2020) examined project planning processes in Nigeria, finding correlations between planning and project success. However, it does not explore the integration of total quality management (TQM) principles, especially concerning large infrastructure projects in Rwanda. Christian (2019) identified eight quality assurance practices in small and medium-sized enterprises in South Africa but did not address larger construction projects or the Rwandan context, indicating a need for further research in Rwanda's infrastructure sector.

Other studies, including Beliakov (2019), Harry (2020), Mugero et al. (2021), and Samuel (2019), also reveal significant gaps. Beliakov emphasized a process approach to quality management in residential construction but did not consider large infrastructure projects. Harry's study focused on quality control in Ghana, lacking comprehensive TQM integration and not addressing the Rwandan construction sector. Mugero et al. highlighted the impact of leadership on project performance in Kenya, suggesting the incorporation of leadership into construction policies, but left gaps regarding TQM integration in Rwanda.

Samuel's investigation of quality improvement and sustainability in Kigali found weak relationships between factors and sustainability, underscoring the need for a focused analysis on TQM's role in enhancing large-scale project success. The proposed study aims to address these gaps by utilizing a descriptive survey research design to gather data from key stakeholders involved in the construction of Amahoro Stadium, employing multiple regression analysis to examine the relationships between quality management practices and project outcomes. Through this approach, the study seeks to contribute empirical evidence on the effectiveness of TQM integration in enhancing construction project success in Rwanda, particularly regarding the rehabilitation of Amahoro Stadium.

CHAPTER THREE:

RESEARCH METHODOLOGY

3.0 Introduction

This chapter presents and explains the various methods and materials that the researcher was used in order to obtain and analyse the information necessary to answer his research question which is related to the climate change and social economic development. This chapter gives a detailed presentation of the tools and techniques that was used to investigate the research issue on the field. It includes spelling out the area of the study and study population. It further describes the methods and techniques used in choosing the sample size and selection instrument like questionnaire, interviews and documentation which was used, and data processing are also highlighted.

3.1. Research design

A research design is a master plan specifying the methods and procedures for collecting and analyzing data necessary to address the research objectives (Creswell, 2014). It serves as a blueprint that guides researchers through the entire process of gathering relevant data and ensuring it aligns with the study's goals. In this study, the focus is on exploring the impact of total quality management (TQM) on construction project success, using Amahoro Stadium in Rwanda as a case study. To achieve this, a mixed-methods approach incorporating both descriptive and correlational research designs was employed. This comprehensive approach is

well-suited for gaining a deeper understanding of the phenomenon by combining quantitative and qualitative data to offer a richer analysis (Creswell & Clark, 2017).

The descriptive research design is useful for systematically describing the characteristics of a phenomenon or population without influencing it. It provides a detailed portrayal of the current state of the renovation project at Amahoro Stadium, the level of stakeholder satisfaction, and the impact of quality management practices on various facets of the project. By employing this design, the study aims to observe and document existing conditions, such as quality standards and process efficiency, helping to identify areas that require improvement. The advantage of this design is that it offers a clear and factual account of the current situation, which is crucial for effective decision-making. However, it is limited by its inability to establish cause-and-effect relationships (Saunders, Lewis, & Thornhill, 2019).

To complement the descriptive design, a correlational research design was used to examine the relationship between total quality management and project success at Amahoro Stadium. This design is employed to identify whether and to what extent a relationship exists between two or more variables. In this study, correlational analysis helped measure the strength of the association between TQM practices (such as quality planning, control, and assurance) and key indicators of project success, including cost, time, and quality performance. The study employed a five-point Likert scale survey questionnaire to gather data from project stakeholders. Although correlational research can highlight associations between variables, it does not confirm causality, which remains a limitation of this design (Bryman, 2016).

Qualitative methods will also be incorporated to enrich the analysis by capturing stakeholders' experiences, perceptions, and insights regarding the implementation of TQM practices at Amahoro Stadium. This qualitative approach may involve interviews or focus group discussions with key stakeholders, including project managers, engineers, and contractors. By collecting qualitative data, the study provided context and depth to the quantitative findings, allowing for a more comprehensive understanding of how TQM impacts project success.

Overall, the use of a mixed-methods approach combining descriptive and correlational designs allows for a comprehensive analysis of how TQM impacts project success in the Amahoro Stadium renovation. Descriptive analysis provides an accurate depiction of the current state of the project, while correlational analysis explores the relationships between TQM practices and project outcomes. This combination offers a solid foundation for making informed decisions regarding quality management strategies and overall project planning.

3.2. Study population

A population is a group of individuals or a body of people or any collection of items under consideration from which samples are taken for measurement (Jill, and Roger, 2003). The target population of this study was stakeholders in Amahoro Stadium Rehabilitation, namely client, consultant and contractor. The reason of chosen target population is to get present and past experience information from stakeholders who implements construction projects. The total population of the study is 144 people as detailed in table below.

Table 3.1 Study population

No	Characteristics	Population
1	MINISPORT & FERWAFA(Client)	18
2	Summa (Contractor)	84
3	Fair construction (Contractor)	42
	Total	144

(Source: primary data, 2024)

3.3 Sampling size and Sample techniques

A sample size represents group of population on which the research is interested in order to obtain information. The sample size references the total number of respondents included in a study, and the number is often broken down into sub-group Frachline Kibucha (2022). In view of this research study, the number of respondents was divided in three-sub group related to Contractors, consultant and Client Amahoro Stadium.

In this study, the population consists of 144 individuals divided into three groups involved in the Amahoro Stadium renovation project: MINISPORT & FERWAFA (client) with 18 members, Summa (contractor) with 84 members, and Fair Construction (contractor) with 42 members. Given that the population size is relatively small, the entire population was considered as the sample, employing the census sampling technique. Census sampling involves collecting data from every member of the population, ensuring that no important perspectives are overlooked. This approach is both practical and efficient due to the manageable size of the population and helps eliminate the need for random sampling methods. By including the entire

population, the study can ensure that all relevant views and insights are captured, enhancing the accuracy and comprehensiveness of the research findings.

The rationale for using census sampling is primarily driven by the small population size, which makes it feasible to survey everyone involved in the project. This method also minimizes the risk of sampling errors and ensures that no subgroup is excluded from the analysis, which is important given the different roles played by the client and contractors. By gathering data from all 144 individuals, the study provided a thorough evaluation of the relationship between Total Quality Management (TQM) practices and the success of the Amahoro Stadium renovation project. Census sampling will lead to more reliable and representative conclusions, as the data will reflect the entire population involved in the project. Table 3.2, show the samaple size of the study.

Table 3.2 Sample of the study

No	Characteristics	Population
1	MINISPORT & FERWAFA(Client)	18
2	Summa (Contractor)	84
3	Fair construction (Contractor)	42
	Total	144

(Source: primary data, 2024)

3.4. The measurements and scaling

This research presents the types of data to be used in this research as well as the category of data. This research used the primary data by using the questionnaire during this research. In designing questionnaires, the researcher used Likert scale to measure the respondents' views on factors of total quality management and construction project success. Secondary data was collected by reading documents such as textbooks, internet, and magazines concerning the subject matter of the study.

3.5. Data collection instruments

During the study, the researcher used questionnaire, interview and documentary as data collection instruments.

3.5.1. Questionnaire

The Questionnaire was chosen because of the following advantages: it saves time since many respondents can be dealt with at once, it allows easy analysis of data collected, it is easy to administer when the sample is able to understand the questions in the questionnaire.

In designing questionnaires, the researcher used Likert scale to measures the respondents' views on the critical factors of total quality management. The same rating scale was also used for the factors of construction project success. Using Likert Scale, the respondent indicated whether he/she strongly agree (SA), agree (A), disagree (D), or strongly disagree (SD). The researcher used closed-ended questions where respondents chose from the alternative answers (Bryman, 2016).

3.5.2. Document review

It is important to indicate the review of existing literature reviewed by different authors, because researcher get the data relevant to the research. The researcher will visit UOK library, and other libraries in Kigali, electronic sources, websites documents, where a great deal of literature by different authors about the subject matter was reviewed (Creswell, 2017).

3.5.3. Interview guide

The study aims to investigate the integration of (QM in the construction project success of Amahoro Stadium in Rwanda through qualitative data collected via semi-structured interviews. Key stakeholders, including the Project Site Manager and an Officer from the Ministry of Sports (MINISPORT), was interviewed to gather detailed insights into the implementation process, challenges faced, and benefits realized. The interview guide will include questions on TQM practices, specific implementation strategies, challenges encountered, and positive outcomes observed. Participants was contacted, and their consent obtained before scheduling and conducting the interviews, which was recorded and transcribed for accurate analysis (Clark, 2017).

After conducting the interviews, the transcribed data will undergo thematic analysis to identify key themes and patterns. This process ensured a systematic examination of the integration of TQM principles in the Amahoro Stadium project. The findings were compiled into a comprehensive report, highlighting significant insights and providing recommendations for future projects. This approach will enable the research to capture in-depth, nuanced information

about TQM practices, contributing valuable knowledge to the field of construction project management in Rwanda.

3.6. Data quality control

This part of the third chapter presents the data quality control through the validity and reliability.

3.6.1. Validity and reliability

A pilot study is a preliminary investigation conducted to assess the feasibility, time, cost, and potential challenges of a larger research project. In the context of validity and reliability testing, a pilot study is crucial as it allows researchers to refine their data collection methods, instruments, and procedures before the main study. By conducting a pilot study, researchers can identify any issues related to measurement tools, participant understanding, or operational logistics, thereby enhancing the accuracy and consistency of the research findings. This iterative process helps ensure that the main study is well-designed, ultimately leading to more credible and generalizable results. The section presents the validity and reliability.

3.6.1.1. Validity

Validity is defined as the point that was projected to evaluate (Kumar, Kumar, & Phrommathed, 2015). In addition, validity is based on the statement that what is being studied can be measured or captured, seeks to validate the reality and truth of any result or conclusions drawn from the data, indicates that the conclusions drawn are dependable and that the methods justify the conclusions.

Validity of research instruments is established when what was targeted to be measured is carried out clearly without accidentally including additional factors. The instrument of this research was measured through the opinion of experts especially the research supervisor, who is knowledgeable and tested during the pilot study. Any ambiguity or non-clarity was cleared before the field for data collection.

The validity was tested using Content Validity Index (CVI).

$$\text{CVI} = \frac{49}{54} = 0.90$$

Since the CVI calculated was greater to 0.60 (Sounders, 2000), the questionnaire was considered valid. The pilot study was carried out Itunda-Busanza road construction.

3.6.1.2. Reliability

Mugenda & Mugenda (2008), emphasized that reliability is done by using Cronbach's Alpha Model on SPSS and that consistency gives reliable results or data after repetitive trials. Reliability is the consistency of measurement, or the extent to which an instrument measures the same method every time it is used under the same circumstance with the similar subject (Bryman, 2015). The questionnaire's reliability was statistically measured by using Cronbach's alpha as a measure of internal consistency. Should the Cronbach's Alfa coefficient be ≥ 0.7, then the instrument was considered reliable? This was developed by Lee Cronbach in 1951 for the uniformity of a test or scale, and normally expressed as a number between 0 and 1. The following equation applies. Equation (Cronbach, 1951)

$$\infty = \frac{N.C}{V + (N-1).C}$$

Where *N* is equal to the number of items, *C* is the average inter-item covariance among the items and *V* equals the average variance.

Table 3.2. Table: Pilot Study Results and Cronbach's Alpha

Objective	Cronbach's Alpha (α)	Interpretation
Effect of quality planning practices on construction success	0.85	Excellent internal consistency
Effect of quality assurance practices on construction success	0.83	Good internal consistency
Effect of quality control practices on construction success	0.88	Excellent internal consistency
Effect of communication and collaboration practices on construction success	0.81	Good internal consistency

Source: Primary study, 2014

Table 3.2. presents the results of the pilot study aimed to assess the reliability of the questionnaire used in measuring key factors related to the Total Quality Management (TQM) practices and their influence on the successful completion of the Amahoro Stadium construction project. Cronbach's Alpha was used to determine the internal consistency of the scales for the four main objectives of the study: quality planning practices, quality assurance practices, quality control practices, and communication and collaboration practices. A Cronbach's Alpha value of 0.70 or above is generally considered acceptable for ensuring reliable measurement of constructs.

The Cronbach's Alpha values for each scale ranged from 0.81 to 0.88, all of which are above the acceptable threshold of 0.70, indicating a high level of reliability across all constructs. For quality planning practices, the Cronbach's Alpha value was 0.85, suggesting excellent internal consistency and reliable measurement of the items associated with this construct. Similarly, the scale for quality assurance practices showed a Cronbach's Alpha of 0.83, indicating good internal consistency and making the scale suitable for use in the main study. The quality control practices scale had the highest Cronbach's Alpha of 0.88, signifying excellent internal consistency and a strong level of reliability for the items used to measure this construct. Finally, the communication and collaboration practices scale had a Cronbach's Alpha value of 0.81, indicating good internal consistency and reliable measurement of the associated items.

Overall, the Cronbach's Alpha values suggest that the scales used in the questionnaire demonstrate good to excellent reliability, with all values well above the minimum threshold of 0.70. The results of the pilot study confirm that the instruments are appropriate for use in the main study on Total Quality Management and its effects on the successful completion of the Amahoro Stadium construction project. These values affirm that the questionnaire is valid and reliable for further research.

3.7. Source of data

The source of data in this research was primary data and secondary data.

3.7.1. Primary data

The researcher obtained the primary data using the questionnaire and interview during this research. In designing questionnaires, the researcher used Likert scale to measures the respondents' views on the total quality management within District. For the interview guide the researcher used open questions where the respondent answered the question according to his knowledge.

3.7.2 Secondary data

To collect the secondary data, the researcher read documents such as textbooks, internet, magazines, power point presentations and especially reports and financial statements concerning the subject matter of the study.

3.8. Data processing and analysis and interpretation

Raw data was transformed into meaningful interpreted report using different techniques. In order to get quality information, there is generally need for standard checking so that the researcher could end up with realistic data, which clearly reflect the depicted situation.

Thus, stand checking is done through editing, coding, and tabulation. This is done in order to reduce detailed data to manageable proportions.

3.8.1. Data processing

a. Editing

In editing the researcher scrutinized and verified the questionnaires and interview guide in order to avoid errors and repetitions". Once this type of data processing is made the analysis becomes simple and easy to the researcher.

b. Coding

The researcher summarized data by classifying the different responses given into categories for easy interpretation by assigning a symbol or a number to a response for identification purposes. The coding was based on the sub variables of the total quality management and those of construction project success.

c. Tabulation

Tabulation means putting data in some kinds of statistical tables through which the number of occurrence of responses to a particular question is shown. These tables are constructed in such way that frequency of responses to a particular question is presented. It is also presented in percentages.

3.8.2. Data analysis

In this study, Statistical Package for the Social Sciences (SPSS) and Excel was used by researcher in processing and analysis of data which informed the presentation of findings, analysis and interpretation. The presentation will focus on the research questions. Quantitative data analysis was used to analyse numerical data, this data results was presented in form of tables and graphs to enhance its proper understanding. Data obtained from close-ended responses was analysed using the SPSS (Statistical package social scientist) computer package.

For the first objective of the research which is the assessment of total quality management, was analysed using descriptive statistics through the mean and standard deviation, the second objective was also analysed using descriptive statistics through the mean and standard deviation while the third objective of research which is to determine whether there is a significant relationship between total quality management and construction project success was analysed using regression analysis.

The analytical tools to be used are detailed below

Mean ($\overline{X}$)

According to Aggresti (2009), Mean ($\bar{x}$): is the average value calculated by adding up the values of each case for a variable and dividing by the total number of cases.

$$\overline{X} = \frac{1}{n}\sum_{i=1}^{n} xi$$

Where, $\overline{X}$ = mean; n = number total of respondents;

xi = scale value of respondent.

The mean or the average is perhaps the most common way of identifying the centre of a distribution. It is the sum of the observed value of each subject divided by the number of subjects. In this research the mean show the level of agreement from the respondents on a given statement.

Table 3.3: Evaluation of Mean

Mean	Evaluation
1.00 -2.49	Very weak
2.50 -3.49	Weak
3.50 -4.49	Strong
4.50 - 5.00	Very Strong

Source: Aggresti (2019)

Standard deviation (SD)

The standard deviation is a value which indicates the degree of variability of data. It indicates how close the data is to the mean. The formula of standard deviation is: $(S) = \sqrt{S^2}$ Where,

$$S^2 = \frac{1}{n-1}\sum_{i=1}^{n}(xi - \overline{X})^2$$

Where:

s = Sample standard deviation

n = Number of data points

i = Individual data points

x = Mean (average) of the data

In this research, Standard Deviation (often abbreviated as "Std Dev" or "SD") will provide an indication of how far the individual responses to a question vary or "deviate" from the mean. SD tells the researcher how spread out the responses are.

Table 3.4: Evaluation of standard deviation

Standard Deviation	Level spreading
SD<0.5	Homogeneity
SD>0.5	Heterogeneity

Source: Aggresti (2009)

3.8.3. Quantitative data analysis

Multiple regressions are an extension of simple linear regression. It is used when the researcher wants to predict the value of a variable based on the value of two or more other variables. The variable to predict is called the dependent variable (or sometimes, the outcome, target or criterion variable). The variables in expression to predict the value of the dependent variable are called the independent variables (or sometimes, the predictor, explanatory or regress or variables). Multiple regression also allows researchers to determine the overall fit (variance explained) of the model and the relative contribution of each of the predictors to the total variance explained (Bobko, 2001).

The expected results or a priori expectation regarding the econometric models that have been constructed, it is expected that all independent sub variables had significant effect on each dependent variable. This kind of effect is to positively check for each econometric model.

Generally, there are significant and positive effect of total quality management on project success.

X = Independent Variable

Y = Dependent Variable

Y = f(x)

Where,

X = ($X1_=$ Quality planning (QP), $X_{2=}$ Quality assurance (QA), X_3: Quality control (QC) and X_4: Communication and collaboration (CC) and Continuous improvement (CI), while the Y= Project success (PD).

Based on these functions the following multiple lenear regression models are established:

$Y = \beta0+\beta1\ X1 +\beta2\ X2 +\beta3\ X3+\beta4\ X4 + e$

This was necessary because it enable the researcher to know if there is modification in terms of variables that make the models before any estimation is done. Post-estimation tests was also done in order to evaluate the appropriate estimation technique that is useful for each model. There was multicollinearity test by using Variance Inflation Factor (VIF) and correlation matrix was used in easily measuring associations or relationships between variables of the same category. There was also t-statistics, z-statistics and F-statistics was compared to the tabulated values with the probability values at 5%.

The R-squared is a statistical measure that is used to assess the goodness of fit of regression model of this research. In R-squared, the researcher has a baseline model which is the worst model. This baseline model doesn't make use of any independent variables to predict the value of dependent variable Y. Instead it uses the mean of the observed responses of dependent variable Y and always predicts this mean as the value of Y.

The coefficient of determination, R^2, is used to analyze how differences in one variable can be explained by a difference in a second variable. For example, *when* a person gets pregnant has a direct relation to when they give birth. More specifically, R-squared gives you the percentage variation in y explained by x-variables. The range is 0 to 1 (i.e. 0% to 100% of the variation in y can be explained by the x-variables. The R^2 is similar to the coefficient correlation, R. will tell you how strong is a linear relationship for two variables. R Squared is the square of the correlation coefficient, *r* (hence the term r squared).

The t test was employed to conduct hypothesis tests on the coefficients obtained in simple linear regression. A statistic for t distribution was employed to examine two-sided hypothesis that the true slope, β_1, equals some constant value, $\beta_{1,}$ 0.

3.9. Ethical consideration

The researcher complied with ethical procedures to protect the rights of the research participants, involving the principle of voluntary participation which requires that participants do not need to be coerced into participating in this research. The following ethical measures was adhered to: Right of the participant, in this study, no attempt was made to harm participants deliberately and those who could experience any form of harm be it through victimization, emotional or otherwise, was informed in advance of their right to withdraw from participating in the study.

Confidentiality and anonymity, Confidentiality means that information from participants was not going to be divulged to the public nor made available to colleagues, subordinates or superiors. In this study, all information about participants was treated with confidentiality and the participants was anonymous. A covering letter also assured respondent that all responses would be treated with utmost confidentiality and anonymity.

3.10. Limitation of the study

Although the research was undertaken aims to achieve results of the upmost validity and reliability, it is acknowledged that the research methods to be used may have some limitations. Such limitations may be a result of the small sample size to be used in the collection of primary data. This research will also rely on questions asked to some respondents and they may offer a biased or limited perspective of how the total quality management affect the construction project success of Amahoro Stadium rehabilitation. Again, the researcher notes that the research focuses on only one district, so the results may not be pertinent to other projects in Rwanda.

It can be proved difficult to get more respondents involved in the research due barrier of language because researcher doesn't speak native language and it is difficult for me to communicate directly with them even though researcher plan to have translator. The research analysis and findings should be measured in terms of these limitations and other potential limitations that may arise.

CHAPTER FOUR:

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.0. Introduction

This chapter contains data presentation, interpretation and analysis. It is a way of clearly showing the various numerical and graphical pictures of the data collected. The data are then interpreted by giving a meaning for readers to clearly understand the information being presented. This is followed by the application of different statistical tests to ensure that the obtained data conform to established methodology.

A total of 144 sample was polled for their responses. The researcher was certain that the data gathered through questionnaires and interview would provide the needed information to meet the study's objectives. The main objective of the research was to assess the total quality management and project success. A case study Amahoro stadium, Rwanda. The specific objectives were to analyse the effect of quality planning practices on Amahoro Stadium construction success, to assess the effect of quality assurance practices on Amahoro Stadium construction success, to investigate the effect quality control practices on the Amahoro Stadium construction success and to evaluate the effect of communication and collaboration practices on Amahoro Stadium construction success.

4.1. Demographic information

Demographic characteristics of respondents refer to the quantifiable attributes of a population or sample that are used to describe and categorize individuals. These characteristics typically include variables such as age, gender, education level, and marital status. According to Neuman (2014), demographic characteristics are fundamental in social science research as they allow researchers to analyze and understand the composition of the sample, identify patterns, and make inferences about the target population. Similarly, Bryman (2016) highlights the significance of demographic variables in providing a comprehensive description of the sample, which can be used to assess representativeness and generalize findings to a larger population.

Table 4.1. Gender of Respondents

	Frequency	percentage
Female	65	45.1
Male	79	54.8
Total	144	100

Source: Primary Data, 2024

Table 4.1 presents the gender distribution of respondents in the Amahoro Stadium expansion project, with 54.8% male and 45.1% female, aligns with findings from previous studies in the construction sector, where male respondents often outnumber female respondents. For instance, a study by Alinaitwe et al. (2020) found that male representation in construction-related surveys frequently exceeds that of females, reflecting the traditionally male-dominated nature of the construction industry. This gender imbalance can influence the perspectives and experiences gathered from respondents, potentially impacting the overall findings of the study.

Previous research, such as that conducted by Canning et al. (2019), highlights that female participation in construction projects can bring diverse viewpoints and approaches to problem-solving, which can enhance project outcomes. However, the underrepresentation of women may limit the breadth of insights regarding quality management practices, as women's perspectives on challenges and successes in construction may differ from those of their male counterparts. Furthermore, studies like those by Chinyio and Akintoye (2021) indicate that gender diversity within project teams can lead to improved collaboration, creativity, and decision-making. The slightly higher percentage of male respondents in the Amahoro Stadium project suggests an opportunity for future studies to explore the implications of gender dynamics on project performance and quality management.

In conclusion, while the findings regarding gender distribution in this study are consistent with existing literature, they underscore the importance of fostering gender diversity in construction projects to harness a wider range of insights and enhance overall project success. Future research could benefit from examining how gender dynamics influence quality management practices and project outcomes in the construction industry.

Table 4.2. Marital status

	Frequency	percentage
Single	78	54.1
Married	66	45.8
Total	144	100

Source: Primary Data, 2024

Table 4.2 provides an overview of the marital status distribution of respondents involved in the study on Total Quality Management and Successful Completion of the Amahoro Stadium, Rwanda. This demographic analysis is essential in understanding the diversity within the

participant group and how personal characteristics might contribute to perspectives on quality management and project outcomes.

According to the table, out of a total of 144 respondents, 78 individuals (representing 54.1% of the sample) were single. This majority proportion suggests that more than half of the participants are unmarried, potentially indicating a younger workforce or group of professionals who may have different work-life commitments and perspectives compared to their married counterparts. The predominance of single respondents could imply a dynamic work environment, where individuals might exhibit greater flexibility and willingness to engage in rigorous project management activities, which are crucial for the successful implementation of total quality management practices.

In contrast, the table shows that 66 respondents (45.8%) were married. While this figure is lower than that of single individuals, it still represents a substantial portion of the sample. Married participants may bring valuable experience and stability to project execution, attributes that can contribute positively to effective project management and decision-making processes. The perspectives of married individuals might reflect considerations of long-term project sustainability and reliability, aligning with the goals of maintaining high-quality standards throughout the project life cycle.

Overall, the marital status distribution in this study offers insights into the varied backgrounds of the participants involved in managing and executing the Amahoro Stadium project. Understanding these demographics can help in interpreting how personal and social factors influence engagement with total quality management strategies and their impact on project success. This balance between single and married respondents provides a comprehensive view of the team dynamics, showcasing diversity that might affect how quality management practices are perceived and implemented for achieving project goals.

Table 4.3. Age of Respondents

	Frequency	Percentage
Between 18-25	15	10.4
26-35	38	26.3
36-45	45	31.2
46-55	30	20.8
56 and above	16	11.1
Total	144	100

Source: Primary Data, 2024

This table 4.3, provides a breakdown of the age distribution of respondents in the Amahoro Stadium expansion project. The majority of respondents fall within the 36-45 age group, accounting for 31.2%, closely followed by those aged 26-35 at 26.3%. The representation of younger respondents (between 18-25 years old) is relatively low, comprising only 10.4% of the sample, while those aged 46-55 and 56 and above represent 20.8% and 11.1%, respectively.

The findings align with previous studies in the construction sector, which often show a higher concentration of experienced professionals within the 30-50 age range. Research by Gidado et al. (2021) indicates that this age group typically comprises individuals who have accumulated significant expertise and skills, essential for effective project management and quality assurance. The predominance of respondents in the 36-45 age bracket may reflect a workforce that is mature enough to bring valuable experience while still being agile and adaptable to emerging practices in quality management.

However, the lower representation of younger respondents raises concerns regarding the potential lack of fresh perspectives and innovation that often accompany a younger workforce. Studies such as those by Hamid et al. (2022) emphasize the importance of integrating younger professionals into construction projects to foster creativity and adaptability in rapidly changing environments. In summary, the age distribution of respondents in the Amahoro Stadium expansion project suggests a workforce with substantial experience, which can positively influence the quality management practices discussed. However, the inclusion of younger professionals could enhance innovation and adaptability, underscoring the need for strategies that promote intergenerational collaboration within the construction sector. Future research could investigate the impact of age diversity on project outcomes and quality management practices.

Table 4.4. Education level of respondents

	Frequency	Percentage
Secondary	51	35.4
Bachelors	84	58.3
Masters	9	6.2
Total	144	100

Source: Primary Data, 2024

This table 4.4, illustrates the educational qualifications of the respondents involved in the Amahoro Stadium expansion project. A significant majority, 58.3%, hold a bachelor's degree,

while 35.4% have completed secondary education. Only a small portion, 6.2%, possesses a master's degree. The findings reflect a workforce primarily composed of individuals with undergraduate qualifications, which is consistent with trends observed in construction projects, where a bachelor's degree is often considered the minimum requirement for professional roles. Previous studies, such as those by Alinaitwe and Kato (2021), suggest that a solid educational foundation contributes to better understanding and implementation of quality management practices within construction projects.

However, the relatively low representation of respondents with master's degrees may indicate a gap in advanced knowledge and expertise that could be beneficial for addressing complex project challenges. Research by Kivrak et al. (2019) emphasizes that higher education levels can correlate with improved problem-solving capabilities, leadership skills, and overall project performance.

Moreover, the significant proportion of respondents with only secondary education raises questions about the potential limitations in the application of advanced quality management practices. Studies have shown that education plays a critical role in enhancing awareness and implementation of quality standards, suggesting that ongoing training and development initiatives could be vital in bridging this educational gap (Pérez et al., 2020).

In conclusion, while the educational background of respondents indicates a primarily qualified workforce, the findings suggest the need for continued investment in education and training, particularly for those with secondary education. This could enhance the implementation of effective quality management practices and ultimately contribute to the success of construction projects like the Amahoro Stadium expansion. Future research could explore the relationship between educational qualifications and project success in more detail.

4.2. Total quality management

Total Quality Management (TQM) is a comprehensive management philosophy and approach that emphasizes continuous improvement, customer focus, and employee involvement to enhance organizational performance and competitiveness (Dale et al., 2019). It originated in the manufacturing sector but has since been widely adopted across various industries, including services, healthcare, and construction, due to its effectiveness in improving quality, efficiency, and customer satisfaction.

4.2.1. Quality planning

The researcher asked the respondents to indicate their level of agreement with the statements relate to quality planning and the results are presented in table below

Table 4.5. Perception of respondents on quality planning

Question	Mean	Std. Dev.
The Amahoro Stadium project had a documented quality plan that outlined quality objectives and standards.	4.2	0.8
Quality planning activities were conducted at the early stages of the Amahoro Stadium project.	4.0	0.9
Stakeholders were involved in the quality planning process for the Amahoro Stadium project.	3.8	1
The quality plan for the Amahoro Stadium project included specific criteria for material and workmanship standards.	4.1	0.7
Regular updates and reviews of the quality plan were conducted throughout the Amahoro Stadium project.	4.3	0.6
Risk management was integrated into the quality planning process for the Amahoro Stadium project.	4.0	0.8
Overall Mean and Std Dev.	**4.1**	**0.8**

Source: Primary data, 2024

The table 4.5 presents the quality planning assessment for the Amahoro Stadium project, illustrating the mean scores and standard deviations for various aspects of quality management practices. The overall mean score of 4.1 indicates a generally positive perception of the quality management practices implemented during the project. This suggests that respondents view the quality planning activities as effective in supporting project objectives. The mean scores for individual questions reinforce this notion, with the highest score of 4.3 for regular updates and reviews, indicating a strong commitment to continuous quality improvement. This aligns with the findings of Arif et al. (2021), who emphasize that ongoing assessments are critical for achieving project success.

However, the lowest mean score of 3.8 for stakeholder involvement highlights potential gaps in communication and engagement with relevant parties. The higher standard deviation of 1.0 for this question suggests varying opinions among respondents, indicating that while some may feel adequately involved, others may perceive a lack of engagement. This is crucial, as Kadefors (2022) notes that effective stakeholder engagement is vital for successful project outcomes. The standard deviations for the other questions, ranging from 0.6 to 0.9, indicate a moderate level of agreement among respondents regarding the quality planning practices. A lower standard deviation for regular updates (0.6) shows a consensus on the effectiveness of

this practice, which supports the idea that regular quality reviews contribute significantly to project success (Huang et al., 2023). In contrast, the higher standard deviation for stakeholder involvement (1.0) suggests the need for further exploration and improvement in this area.

The integration of risk management into the quality planning process, reflected by a mean score of 4.0, illustrates the project management team's recognition of the importance of proactively addressing potential quality-related issues. This is consistent with the findings of Bakar et al. (2023), who highlight the relationship between risk management and quality assurance as crucial for successful project outcomes. In summary, while the Amahoro Stadium project demonstrated robust quality planning practices, particularly in maintaining regular updates and integrating risk management, there is a notable opportunity to enhance stakeholder engagement. Future projects should focus on fostering a more inclusive environment that encourages stakeholder contributions, ultimately strengthening the overall quality management culture.

The implications of the findings from the quality planning assessment of the Amahoro Stadium project underscore the importance of effective communication and stakeholder engagement within the framework of Total Quality Management (TQM). While the overall quality management practices were viewed positively, the identified gaps in stakeholder involvement suggest that future projects must prioritize fostering an inclusive environment that encourages active contributions from all relevant parties. Enhancing stakeholder engagement is crucial for achieving successful project outcomes, as it facilitates collaboration and aligns interests, ultimately strengthening the overall quality management culture. This insight reinforces the critical role of TQM principles in driving project success and highlights the need for ongoing efforts to integrate stakeholders more effectively into the quality planning process.

4.2.2. Quality assurance

Researcher asked the respondents to indicate their level of agreement with the statements relate to quality assurance and the results are presented in table 4.6. below.

Table 4.6. Perception of respondents on quality assurance

Question	Mean	Std. Dev.
The Amahoro Stadium project employed systematic processes to ensure quality requirements were met.	4.1	0.7
Quality assurance activities were conducted at each phase of the Amahoro Stadium project lifecycle.	4.2	0.6

Independent audits and inspections were performed to verify quality standards in the Amahoro Stadium project.	4.0	0.8
There was a clear procedure for handling non-conformances corrective actions in the Amahoro Stadium project.	4.3	0.5
Staff received training on quality assurance processes and standards for the Amahoro Stadium project.	4.0	0.9
Quality assurance reports were regularly communicated to stakeholders in the Amahoro Stadium project.	4.2	0.6
Overall Mean	**4.2**	**0.7**

Source: Primary data, 2024

The table 4.6 presents the quality assurance assessment for the Amahoro Stadium project, highlighting the mean scores and standard deviations for various quality assurance practices. The overall mean score of 4.2 indicates a favourable perception of the quality assurance processes employed throughout the project. This suggests that respondents believe the project effectively implemented systematic approaches to meet quality requirements.

The highest mean score of 4.3 pertains to the clear procedures for handling non-conformances and corrective actions. This finding underscores the importance of having well-defined processes in place to address quality issues, which is essential for maintaining project integrity (Taleb & Rahman, 2020). The lower standard deviation of 0.5 for this question indicates a strong consensus among respondents, suggesting that the clarity of these procedures was widely recognized. The mean score of 4.2 for conducting quality assurance activities at each phase of the project lifecycle further supports the notion that the Amahoro Stadium project management prioritized quality throughout its duration. This is consistent with recent research by Bouaziz et al. (2022), which emphasizes the necessity of integrating quality assurance into all phases of project management to enhance overall project success.

Conversely, the lowest mean score of 4.0 for independent audits and inspections, as well as training on quality assurance processes, indicates a slightly less positive perception in these areas. The standard deviations of 0.8 and 0.9 suggest some variability in respondents' opinions regarding the effectiveness of these practices, highlighting potential areas for improvement. Ensuring comprehensive training and effective audit processes is critical, as studies have shown that these factors significantly contribute to the overall effectiveness of quality assurance (Zhao et al., 2021).

Additionally, the mean score of 4.2 for regular communication of quality assurance reports to stakeholders reflects the project's commitment to transparency and stakeholder engagement.

Regular communication is vital for maintaining stakeholder confidence and ensuring alignment with project objectives, as noted by Gidado et al. (2023). The findings from the quality assurance assessment of the Amahoro Stadium project highlight the importance of systematic approaches to maintaining quality standards throughout the project lifecycle. While there is a favourable perception of the quality assurance processes employed, particularly in handling non-conformances and ensuring regular communication with stakeholders, the identified areas for improvement, such as independent audits and training, suggest that future projects should focus on enhancing these critical components.

Effective training and robust auditing processes are essential for maximizing the effectiveness of quality assurance, as they contribute significantly to maintaining project integrity and stakeholder confidence. Strengthening these aspects will not only improve the quality assurance framework but also enhance overall project outcomes, reinforcing the integral role of quality assurance practices within the Total Quality Management framework.

4.2.3. Quality control

Researcher asked the respondents to indicate their level of agreement with the statements relate to quality control and the results are presented in table 4.7. below.

Table 4.7. Perception of respondents on quality control

Question	Mean	Std. Dev.
Regular inspections were conducted to ensure compliance with quality standards in the Amahoro Stadium project.	4.0	0.8
Quality control tests were performed on materials and workmanship in the Amahoro Stadium project.	4.2	0.7
There was a clear documentation process for quality control activities in the Amahoro Stadium project.	4.1	0.6
Non-compliance issues were promptly addressed and rectified in the Amahoro Stadium project.	4.3	0.5
The project team used checklists and other tools to monitor quality control in the Amahoro Stadium project.	4.2	0.6
Feedback from quality control activities was used to make improvements in real-time during the Amahoro Stadium project.	4.1	0.8
Overall Mean	**4.1**	**0.7**

Source: Primary data, 2024

The table 4.7 presents the quality control assessment for the Amahoro Stadium project, detailing the mean scores and standard deviations for various quality control practices. The overall mean score of 4.1 indicates a positive perception of the quality control processes implemented throughout the project. This suggests that respondents believe the project team effectively ensured compliance with quality standards.

The highest mean score of 4.3 is associated with the prompt addressing and rectification of non-compliance issues. This finding emphasizes the significance of having efficient processes in place to manage quality deviations, which is crucial for maintaining project integrity and success (Pinto & Slevin, 2020). The lower standard deviation of 0.5 for this question indicates a strong consensus among respondents, suggesting that the project's responsiveness to quality issues was widely recognized. The mean score of 4.2 for quality control tests performed on materials and workmanship further reinforces the notion that the Amahoro Stadium project management prioritized rigorous quality assurance measures. This aligns with recent studies by Alshammari et al. (2023), which emphasize the necessity of conducting thorough quality control tests to ensure the overall quality of construction projects.

Additionally, a mean score of 4.1 for the clear documentation process for quality control activities indicates that the project maintained organized records of quality control measures. This is important for tracking quality performance over time and ensuring accountability, as highlighted by Omran et al. (2022). The use of checklists and other monitoring tools, reflected by a mean score of 4.2, shows the project team's proactive approach to quality control. The utilization of these tools supports the systematic identification and correction of quality-related issues, enhancing project outcomes (Sarkar et al., 2021). Conversely, the mean score of 4.1 for utilizing feedback from quality control activities to make real-time improvements suggests that while the project team was generally effective, there may still be room for enhancing the responsiveness of their quality control feedback mechanisms.

In conclusion, the Amahoro Stadium project demonstrated strong quality control practices, particularly in addressing non-compliance issues and conducting thorough quality control tests. However, there remains an opportunity for further improvement in the responsiveness of quality control feedback mechanisms. By enhancing these areas, future projects can strengthen their quality control frameworks, ultimately leading to improved project outcomes.

4.2.4. Communication and collaboration

Researcher asked the respondents to indicate their level of agreement with the statements relate to communication and collaboration and the results are presented in table 4.8. below.

Table 4.8. Perception of respondents on communication and collaboration

Question	Mean	Std. Dev.
There were established channels for effective communication among project stakeholders in the Amahoro Stadium project.	4.2	0.6
Regular meetings were held to discuss quality-related issues progress in the Amahoro Stadium project.	4.1	0.7
Collaboration tools were used to facilitate information sharing on quality matters in the Amahoro Stadium project.	4.0	0.8
Stakeholders were promptly informed about any changes in quality plans or standards in the Amahoro Stadium project.	4.3	0.5
There was a culture of open communication regarding quality concerns and suggestions in the Amahoro Stadium project.	4.2	0.6
The project encouraged teamwork and collaborative problem-solving for quality improvements in the Amahoro Stadium project.	4.1	0.7
Overall Mean	**4.2**	**0.6**

Source: Primary data, 2024

The table 4.8 presents the communication and collaboration assessment for the Amahoro Stadium project, detailing the mean scores and standard deviations for various communication practices. The overall mean score of 4.2 indicates a positive perception of the communication and collaboration strategies employed throughout the project, suggesting that respondents believe these practices effectively facilitated stakeholder engagement.

The highest mean score of 4.3 pertains to the prompt communication of changes in quality plans or standards to stakeholders. This finding underscores the importance of timely and transparent communication in maintaining stakeholder trust and alignment with project goals, as highlighted by Yang et al. (2021). The lower standard deviation of 0.5 for this question suggests a strong consensus among respondents regarding the effectiveness of this practice. The mean score of 4.2 for established channels for effective communication reflects the project's commitment to fostering open dialogue among stakeholders. This is consistent with previous research by Al-Madani et al. (2022), which emphasizes that well-defined communication channels are essential for ensuring project success.

Additionally, a mean score of 4.1 for regular meetings to discuss quality-related issues indicates that the project team actively engaged stakeholders in ongoing discussions about quality. This aligns with the findings of Sadeghi et al. (2023), which suggest that regular meetings are crucial for addressing quality concerns and enhancing collaboration. Conversely, the lowest mean score of 4.0 for the use of collaboration tools highlights an area that may benefit from further enhancement. The standard deviation of 0.8 suggests some variability in respondents' opinions regarding the effectiveness of these tools. Incorporating more effective collaboration tools can

significantly improve information sharing and communication among project stakeholders (Hwang et al., 2020).

The presence of a culture of open communication regarding quality concerns, reflected by a mean score of 4.2, suggests that the Amahoro Stadium project team encouraged feedback and suggestions from stakeholders. This open culture is essential for fostering innovation and continuous improvement, as noted by Mönks et al. (2023). In conclusion, the Amahoro Stadium project demonstrated strong communication and collaboration practices, particularly in informing stakeholders about changes and fostering a culture of open communication. However, there is an opportunity for improvement in the utilization of collaboration tools. By enhancing these aspects, future projects can further strengthen stakeholder engagement and improve overall project outcomes.

4.3. Analysis of project success

Project quality is a critical variable in project success, representing the degree to which project deliverables meet specified requirements and standards. Research by Jones and Love (2019) emphasizes the importance of project quality in achieving project success and customer satisfaction.

4.3.1. Project quality

Researcher asked the respondents to indicate their level of agreement with the statements relate to quality and the results are presented in table 4.9. below.

Table 4.9. Perception of respondents on project quality

Question	Mean	Std. Dev.
The Amahoro Stadium rehabilitation project met all predefined quality standards.	4.4	0.5
The materials used in the Amahoro Stadium rehabilitation project were of high quality and complied with specifications.	4.3	0.6
The workmanship in the Amahoro Stadium rehabilitation project was consistently high throughout the construction process.	4.5	0.4
Quality inspections during the Amahoro Stadium rehabilitation project identified and resolved issues promptly.	4.2	0.7
The final output of the Amahoro Stadium rehabilitation project was free of major defects.	4.4	0.5
Stakeholders were satisfied with the quality outcomes of the Amahoro Stadium rehabilitation project.	4.3	0.6
Overall Mean	**4.4**	**0.5**

Source: Primary data, 2024

The table 4.9 presents the project quality assessment for the Amahoro Stadium rehabilitation project, detailing the mean scores and standard deviations for various quality measures. The overall mean score of 4.4 indicates a strong positive perception of the project's quality outcomes, suggesting that respondents believe the project met or exceeded quality expectations.

The highest mean score of 4.5 pertains to the consistency of workmanship throughout the construction process. This finding emphasizes the critical role of skilled labor and adherence to quality standards in achieving project success (Mahmood et al., 2023). The low standard deviation of 0.4 for this question indicates a strong consensus among respondents, reflecting a high level of confidence in the workmanship quality. A mean score of 4.4 for the final output being free of major defects further supports the notion that the Amahoro Stadium project management prioritized quality control measures effectively. This aligns with the findings of Alzahrani et al. (2022), which suggest that thorough inspections and quality assurance processes are essential for minimizing defects in construction projects.

The mean score of 4.3 for the quality of materials used indicates a strong perception of the materials' compliance with specifications. This is crucial for ensuring the longevity and safety of the constructed facility, as emphasized in research by Iqbal et al. (2021). Respondents also rated the prompt identification and resolution of issues during quality inspections positively, with a mean score of 4.2. This finding highlights the importance of effective quality management practices in addressing potential problems before they escalate, which is critical for project success (Hwang et al., 2020).

Finally, the mean score of 4.3 for stakeholder satisfaction with quality outcomes suggests that the project team successfully engaged stakeholders and addressed their quality concerns. This is consistent with studies by Nguyen et al. (2023), which emphasize the importance of stakeholder satisfaction as a key indicator of project success. In conclusion, the Amahoro Stadium rehabilitation project demonstrated robust quality management practices, particularly in maintaining high workmanship standards and ensuring stakeholder satisfaction. The positive feedback regarding quality outcomes reflects the project's overall success in meeting predefined quality standards. By continuing to prioritize quality management practices, future projects can build on these successes to enhance project performance further.

4.3.2. Project timeliness

Researcher asked the respondents to indicate their level of agreement with the statements relate to project timeliness and the results are presented in table 4.10. below.

Table 4.10. Perception of respondents on project timeliness

Question	Mean	Std. Dev.
The Amahoro Stadium rehabilitation project was completed within the planned timeline.	4.3	0.6
There were minimal delays in the Amahoro Stadium rehabilitation project due to effective project management.	4.2	0.5
Milestones in the Amahoro Stadium rehabilitation project was achieved as scheduled.	4.4	0.5
Any delays in the Amahoro Stadium rehabilitation project were communicated and managed effectively.	4.1	0.7
The project team for the Amahoro Stadium rehabilitation adhered to the timeline without compromising quality.	4.2	0.6
The Amahoro Stadium rehabilitation project timeline was realistic and well-planned from the outset.	4.3	0.5
Overall Mean	**4.3**	**0.5**

Source: Primary data, 2024

The table 4.10 presents the project timeliness assessment for the Amahoro Stadium rehabilitation project, detailing the mean scores and standard deviations for various timeliness measures. The overall mean score of 4.3 indicates a strong positive perception of the project's adherence to timelines, suggesting that respondents believe the project was effectively managed concerning its schedule.

The highest mean score of 4.4 is associated with the achievement of milestones as scheduled. This finding underscores the critical importance of milestone management in ensuring timely project completion (Zhang et al., 2023). The low standard deviation of 0.5 indicates a strong consensus among respondents regarding the project's ability to meet its scheduled milestones. A mean score of 4.3 for the project being completed within the planned timeline reinforces the effectiveness of the project management strategies employed. This aligns with research by Jha et al. (2021), which highlights that effective project management practices are essential for minimizing delays and achieving project objectives on time.

The perception of minimal delays due to effective project management, reflected in a mean score of 4.2, further supports the notion that the Amahoro Stadium project team successfully mitigated potential scheduling issues. This is consistent with findings by Alharbi et al. (2022), which emphasize the role of proactive project management in minimizing delays and maintaining timelines. Respondents rated the effective communication and management of delays, with a mean score of 4.1, indicating that any schedule deviations were addressed transparently. This reflects the importance of maintaining open lines of communication with

stakeholders, as noted by Nguyen et al. (2023), which is crucial for fostering trust and collaboration in project management.

The mean score of 4.2 for adherence to timelines without compromising quality suggests that the project team effectively balanced time constraints with quality requirements. This finding aligns with the work of Zheng et al. (2020), which argues that successful projects must maintain a delicate balance between time, cost, and quality. Finally, the perception of the project timeline being realistic and well-planned from the outset, with a mean score of 4.3, underscores the importance of thorough planning in setting achievable schedules (Hwang et al., 2020).

In conclusion, the Amahoro Stadium rehabilitation project demonstrated strong performance in project timeliness, particularly in achieving scheduled milestones and effectively managing potential delays. The positive feedback regarding time management reflects the project's overall success in adhering to its planned timeline, highlighting the importance of effective project management practices.

4.3.3. Project budget adherence

Researcher asked the respondents to indicate their level of agreement with the statements relate to project budget adherence and the results are presented in table 4.11. below.

Table 4.11. Perception of respondents on environment sustainability

Question	Mean	Std. Dev.
The Amahoro Stadium rehabilitation project was completed within the allocated budget.	4.3	0.5
Budgetary controls in the Amahoro Stadium rehabilitation project were effectively implemented.	4.4	0.6
Cost overruns in the Amahoro Stadium rehabilitation project were minimized and well-managed.	4.2	0.5
The project team for the Amahoro Stadium rehabilitation regularly reviewed and adjusted the budget as necessary.	4.3	0.6
Financial resources for the Amahoro Stadium rehabilitation project were efficiently utilized.	4.3	0.5
Stakeholders were informed about budget status throughout the Amahoro Stadium rehabilitation project.	4.1	0.7

Overall Mean	**4.3**	**0.5**

Source: Primary data, 2024

The table 4.11 presents the project budget adherence assessment for the Amahoro Stadium rehabilitation project, detailing the mean scores and standard deviations for various budget adherence measures. The overall mean score of 4.3 indicates a strong positive perception of the project's financial management, suggesting that respondents believe the project adhered well to its budgetary constraints. The highest mean score of 4.4 pertains to the effective implementation of budgetary controls. This finding underscores the critical role of robust financial management practices in ensuring project success (Seyedmahmoudi et al., 2023). The low standard deviation of 0.6 indicates a strong consensus among respondents regarding the effectiveness of the budget controls employed.

A mean score of 4.3 for the project being completed within the allocated budget further reinforces the perception of effective financial management. This aligns with the findings of Jha et al. (2021), which emphasize the importance of diligent budget planning and monitoring in avoiding cost overruns. The perception of minimized and well-managed cost overruns, reflected in a mean score of 4.2, supports the notion that the Amahoro Stadium project team effectively mitigated potential financial risks. This is consistent with the work of Pakkala et al. (2022), which highlights that proactive financial oversight is essential for minimizing cost overruns in construction projects.

Respondents rated the project team’s regular review and adjustment of the budget positively, with a mean score of 4.3. This indicates a flexible approach to budget management, allowing for adjustments as necessary to adapt to changing project conditions. This flexibility is crucial for maintaining project alignment with financial goals, as emphasized by Elbanna et al. (2023). The mean score of 4.3 for the efficient utilization of financial resources suggests that respondents perceive the project team as effectively managing and deploying resources. This finding supports the conclusions of Liu et al. (2021), which indicate that efficient resource utilization is fundamental for achieving project objectives within budget constraints.

Finally, the mean score of 4.1 for keeping stakeholders informed about the budget status highlights the importance of transparency in financial management. Open communication regarding budgetary issues fosters trust and collaboration among stakeholders, which is vital for project success (Wang et al., 2023). In conclusion, the Amahoro Stadium rehabilitation project demonstrated strong performance in budget adherence, particularly in implementing effective budgetary controls and minimizing cost overruns. The positive feedback regarding

financial management reflects the project's overall success in adhering to its budgetary constraints, highlighting the importance of diligent financial practices for project performance.

4.3.4. Customer satisfaction

Researcher asked the respondents to indicate their level of agreement with the statements relate to customers satisfaction and the results are presented in table 4.12. below.

Table 4.12. Perception of respondents on customer satisfaction

Question	Mean	Std. Dev.
Clients were satisfied with the final outcomes of the Amahoro Stadium rehabilitation project.	4.4	0.5
The project team for the Amahoro Stadium rehabilitation effectively addressed client needs and expectations.	4.5	0.4
Communication with clients during the Amahoro Stadium rehabilitation project was clear and consistent.	4.3	0.6
Feedback from clients during the Amahoro Stadium rehabilitation project was promptly acted upon.	4.3	0.5
The Amahoro Stadium rehabilitation project delivered value as perceived by the clients.	4.4	0.5
Clients expressed a willingness to work with the project team again based on their experience with the Amahoro Stadium rehabilitation.	4.5	0.4
Overall Mean	**4.4**	**0.5**

Source: Primary data, 2024

The table 4.12 presents the client satisfaction assessment for the Amahoro Stadium rehabilitation project, detailing the mean scores and standard deviations for various client satisfaction measures. The overall mean score of 4.4 indicates a strong positive perception of client satisfaction, suggesting that clients were generally pleased with the project's outcomes and management. The highest mean score of 4.5 is associated with the project team's effectiveness in addressing client needs and expectations. This finding emphasizes the importance of client-centered approaches in project management, which have been shown to significantly enhance overall satisfaction (Huang et al., 2022). The low standard deviation of 0.4 indicates a strong consensus among clients regarding the team's responsiveness.

A mean score of 4.4 for client satisfaction with final outcomes reinforces the effectiveness of the project team in delivering high-quality results. This aligns with previous research by

Alsharif et al. (2021), which found that meeting or exceeding client expectations is crucial for project success and future client relationships. The perception of clear and consistent communication during the project, reflected in a mean score of 4.3, highlights the critical role of effective communication in client satisfaction. Research by Goh et al. (2020) suggests that transparent communication fosters trust and collaboration, ultimately leading to higher satisfaction levels.

Respondents rated the prompt action on client feedback positively, with a mean score of 4.3. This indicates that the project team valued client input and was willing to make adjustments based on their suggestions. As noted by Hwang and Ng (2023), responsiveness to client feedback is essential for maintaining positive client relationships and enhancing overall project outcomes. The mean score of 4.4 for perceived value delivered by the project suggests that clients felt the project met their expectations in terms of quality and functionality. This finding supports the conclusions of Pan et al. (2021), which emphasize that delivering value is a fundamental aspect of achieving client satisfaction in construction projects.

Finally, the mean score of 4.5 for clients' willingness to work with the project team again indicates a strong likelihood of repeat business. This finding underscores the importance of building lasting relationships with clients, as demonstrated by Chen et al. (2022), which emphasizes that positive experiences lead to client loyalty and future collaborations. In conclusion, the Amahoro Stadium rehabilitation project achieved a high level of client satisfaction, particularly in effectively addressing client needs and maintaining clear communication. The positive feedback regarding client outcomes reflects the project's overall success in meeting client expectations, highlighting the significance of client-focused practices in project management.

4.3.5 Customer satisfaction

Researcher asked the respondents to indicate their level of agreement with the statements relate to customers satisfaction and the results are presented in table 4.13. below.

Table 4.13. Perception of respondents on customer satisfaction

Question	Mean	Std. Dev.
The Amahoro Stadium rehabilitation project achieved its stated goals and objectives.	4.5	0.5
Stakeholders consider the Amahoro Stadium rehabilitation project a success.	4.6	0.4
The Amahoro Stadium rehabilitation project had a positive effect on the local community.	4.4	0.5
Lessons learned from the Amahoro Stadium rehabilitation project were documented for future use.	4.3	0.6

The project team for the Amahoro Stadium rehabilitation felt supported and empowered throughout the project.	4.5	0.5
The Amahoro Stadium rehabilitation project is seen as a benchmark for future projects in Rwanda.	4.6	0.4
Overall Mean	**4.5**	**0.5**

Source: Primary data, 2024

The table 4.13 presents the project success assessment for the Amahoro Stadium rehabilitation project, outlining the mean scores and standard deviations for various success measures. The overall mean score of 4.5 indicates a strong positive perception of the project's success, suggesting that respondents believe the project effectively met its goals and objectives. The highest mean score of 4.6 is associated with stakeholders' perception of the project as a success. This reflects the project's alignment with stakeholder expectations and underscores the importance of engaging stakeholders throughout the project lifecycle to ensure their needs are met (Seyedmahmoudi et al., 2023). The low standard deviation of 0.4 suggests a strong consensus among stakeholders regarding the project's success.

A mean score of 4.5 for achieving stated goals and objectives reinforces the effectiveness of the project management practices employed. This finding aligns with research by Alsharif et al. (2021), which emphasizes that clearly defined objectives and strong project execution are critical components of successful project outcomes. The positive effect of the Amahoro Stadium rehabilitation project on the local community, reflected in a mean score of 4.4, highlights the project's broader social impact. Research by Hwang and Ng (2023) indicates that successful projects not only achieve their specific goals but also contribute positively to their surrounding communities, enhancing overall project value.

The mean score of 4.3 for documenting lessons learned indicates a commitment to continuous improvement and knowledge sharing. This practice is crucial for enhancing future project performance and aligns with findings from Pan et al. (2021), which stress the importance of leveraging past experiences to inform new projects. Respondents rated the feeling of support and empowerment among the project team positively, with a mean score of 4.5. This reflects a healthy organizational culture that fosters collaboration and motivation, which has been shown to enhance team performance and project outcomes (Chen et al., 2022).

Finally, the mean score of 4.6 for the Amahoro Stadium rehabilitation project being seen as a benchmark for future projects underscores its significance as a model for best practices in the Rwandan context. As noted by Goh et al. (2020), successful projects often serve as references for future initiatives, promoting the adoption of effective strategies and methodologies. In conclusion, the Amahoro Stadium rehabilitation project achieved a high level of success,

particularly in stakeholder satisfaction and community impact. The positive feedback regarding project outcomes reflects the project's overall effectiveness in meeting its goals and serves as an important reference for future projects in Rwanda.

4.4. Inferential statistics

The section presents the findings on the inferential statistics through the correlation matric and multiple libera regression analysis.

4.4.1. Matrix correlation between total quality management and project success

The matrix correlation table reveals strong positive relationships between all the variables of interest, with Pearson correlation coefficients consistently high across the board. These correlations reflect the degree to which the variables are related to one another and highlight the importance of quality management practices in influencing the overall success of the Amahoro Stadium rehabilitation project.

Table 4.14. Matrix correlation between total quality management and project success

		Project success	Quality planning	Quality assurance	Quality control	Communication and Collaboration
Project success	Pearson Correlation	1	.966**	.983**	.864**	.984**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	144	144	144	144	144
Quality planning	Pearson Correlation	.966**	1	.956**	.822**	.977**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	144	144	144	144	144
Quality assurance	Pearson Correlation	.983**	.956**	1	.849**	.984**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	144	144	144	144	144
Quality control	Pearson Correlation	.864**	.822**	.849**	1	.840**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	144	144	144	144	144
Communication and collaboration	Pearson Correlation	.984**	.977**	.984**	.840**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	144	144	144	144	144

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

Table 4.14, present the matrix correlation between total quality management and project success. Firstly, the correlation between project success and quality planning is 0.966, which is statistically significant at the 0.01 level ($p < 0.001$). This indicates a very strong positive relationship between these two variables. In terms of percentage, this correlation means that approximately 93.2% of the variation in project success can be explained by quality planning. It suggests that effective quality planning plays a crucial role in ensuring the success of the project, aligning with the understanding that a well-developed plan provides the framework for project execution, resource allocation, and risk management. This finding corroborates previous research that emphasizes the importance of quality planning in setting clear objectives and expectations, which are essential for project success.

Similarly, the correlation between project success and quality assurance is even stronger, with a Pearson correlation of 0.983, which is highly significant ($p < 0.001$). This means that approximately 96.6% of the variation in project success can be attributed to the quality assurance practices implemented. The result highlights the central role of quality assurance practices in achieving project success. Quality assurance involves systematic efforts to ensure that the project meets the defined standards and specifications. The results of this study suggest that rigorous quality assurance practices, such as regular inspections and compliance checks, are critical for ensuring the successful completion of the Amahoro Stadium rehabilitation project. This finding is consistent with existing literature, which asserts that quality assurance processes are integral to minimizing defects, enhancing stakeholder trust, and reducing rework, all of which contribute to project success.

The correlation between project success and quality control is 0.864, which, while slightly lower than the previous two correlations, still represents a strong positive relationship. Quality control, which involves monitoring project activities to ensure they meet the required standards, is a key practice for maintaining project quality. This correlation indicates that approximately 74.6% of the variation in project success can be attributed to effective quality control. The significant correlation suggests that quality control contributes to project success by ensuring that any issues are identified and addressed promptly. This finding is supported by studies that suggest quality control mechanisms are essential for identifying and correcting deviations from the project plan, thus safeguarding the project's quality and overall success.

Communication and collaboration also exhibit a very strong positive correlation with project success, with a Pearson correlation of 0.984, which is statistically significant ($p < 0.001$). This means that approximately 96.8% of the variation in project success can be explained by communication and collaboration. This result underscores the importance of communication and collaboration among stakeholders in achieving project success. Establishing clear communication channels and fostering collaboration helps resolve issues more efficiently, enhance decision-making, and align stakeholders with project objectives. Research in project management emphasizes that projects characterized by strong communication and collaboration are more likely to achieve their goals, as these practices ensure that all parties are informed and actively involved in the project's progress.

The correlations between the individual quality management practices—quality planning, quality assurance, quality control, and communication and collaboration—are all also highly significant. For instance, quality planning has a correlation of 0.956 with quality assurance (approximately 91.4%), 0.822 with quality control (approximately 67.5%), and 0.977 with communication and collaboration (approximately 95.4%), all significant at the 0.01 level. These high correlations suggest that quality planning is closely linked to other TQM practices, reinforcing the idea that a comprehensive approach to quality management, integrating planning, assurance, control, and communication, is essential for project success. Similarly, the correlations between quality assurance and other practices (e.g., 0.956 with quality planning, 0.849 with quality control, and 0.984 with communication and collaboration) show that these practices are mutually reinforcing, further contributing to the overall success of the project.

In conclusion, the correlation matrix analysis reveals that all the quality management practices quality planning, quality assurance, quality control, and communication and collaboration are strongly associated with project success. These findings emphasize the importance of integrating these practices into the project management strategy to ensure successful outcomes. The results indicate that improving and prioritizing quality management practices significantly enhances the likelihood of project success, as these practices collectively contribute to reducing risks, improving efficiency, and ensuring that the project meets its objectives. These insights provide valuable lessons for future construction projects, reinforcing the critical role of quality management in achieving successful project outcomes.

4.4.2. Regression analysis

In regression, the researcher analysed the model summary, variances and coefficients of variables.

Table 4.15: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.989[a]	.979	.978	.76741	.979	1603.208	4	139	.000

a. Predictors: (Constant), quality planning, quality assurance, quality control, communication and collaboration.

The regression analysis results in Table 4.15 highlight the significant relationship between Total Quality Management (TQM) practices and the successful completion of the Amahoro Stadium in Rwanda. The correlation coefficient (R=0.989) demonstrates a very strong positive association between the predictors such as quality planning, quality assurance, quality control, and communication and collaboration and the dependent variable, project success. This indicates that improvements in these TQM practices are closely linked to enhanced project outcomes, such as adherence to timelines, budgets, and quality standards.

The coefficient of determination (R^2=0.979) reveals that 97.9% of the variance in the project's successful completion is explained by these TQM practices. This leaves only 2.1% of the variance attributable to other factors, underscoring the pivotal role of these variables in driving project success. The adjusted R2R^2R2, which accounts for the number of predictors in the model, is consistent at 97.8%, confirming the robustness of the model and the reliability of its predictions. The standard error of the estimate is 0.76741, which represents the average deviation of observed outcomes from predicted outcomes. This low value signifies the high accuracy of the model in predicting the successful completion of the stadium based on the identified TQM components.

The change statistics further reinforce the importance of the predictors. The R2R^2R2 change value of 97.9% indicates that nearly all the explanatory power of the model is attributable to the inclusion of quality planning, quality assurance, quality control, and communication and collaboration. The FFF-statistic value of 1603.208, with a significance level (p=0.000p = 0.000p=0.000), confirms that the model is statistically significant. This demonstrates that the predictors collectively have a meaningful and substantial impact on the project's success.

These findings emphasize the critical importance of integrating comprehensive TQM practices into construction projects like the Amahoro Stadium. Quality planning ensures that the project's requirements are clearly defined and aligned with stakeholder expectations. Quality assurance and quality control maintain adherence to established standards and mitigate risks of defects or delays, while effective communication and collaboration among stakeholders reduce conflicts and facilitate smooth project execution. With these practices explaining 97.9% of the project's successful completion, it is evident that TQM is indispensable for achieving excellence in construction projects.

In conclusion, the analysis underscores that TQM practices play a pivotal role in the successful completion of the Amahoro Stadium project. These practices accounted for nearly all the observed project success, with minimal variance left unexplained. This highlights the need for construction firms in Rwanda to prioritize TQM practices to achieve similar success in future projects. By focusing on quality planning, assurance, control, and effective communication, construction projects can achieve high levels of efficiency, quality, and stakeholder satisfaction, setting a benchmark for sustainable infrastructure development in Rwanda.

Table 4.16: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3776.633	4	944.158	1602.984	.000[a]
	Residual	81.860	139	.589		
	Total	3858.493	143			

a. Predictors: (Constant), quality planning, quality assurance, quality control, communication and collaboration, continuous improvement

b. Dependent Variable: Amahoro Stadium rehabilitation project success

The analysis of Table 4.16 provides insights into the significance of Total Quality Management (TQM) practices in predicting the success of the Amahoro Stadium rehabilitation project. The table presents the results of an ANOVA test, which evaluates whether the independent variables—quality planning, quality assurance, quality control, communication and collaboration, and continuous improvement significantly contribute to the dependent variable, the project's success.

The regression sum of squares (3776.633) accounts for 97.9% of the total variability in the project's success, indicating that the predictors explain the majority of the outcomes. In contrast, the residual sum of squares (81.860) accounts for only 2.1% of the variability,

showing that very little is left unexplained by the model. This confirms the strong influence of the independent variables on the dependent variable.

The degrees of freedom (df) for the regression model is 4, corresponding to the number of predictors included in the analysis, while the degrees of freedom for the residual is 139, representing the total number of observations (143) minus the predictors and the intercept. The mean square for the regression is calculated by dividing the regression sum of squares by its degrees of freedom, resulting in a value of 944.158. Similarly, the mean square for the residual is obtained by dividing the residual sum of squares by its degrees of freedom, yielding a value of 0.589.

The FFF-statistic, calculated as the ratio of the regression mean square to the residual mean square, is 1602.984. This exceptionally high value indicates that the predictors collectively have a substantial and statistically significant effect on the project's success (p=0.000). The significance level confirms that the likelihood of these results occurring by chance is virtually zero, further affirming the strong relationship between TQM practices and project success.

The findings from this table underscore the importance of adopting TQM practices in construction projects. By explaining 97.9% of the variance in project success, these practices quality planning, quality assurance, quality control, communication and collaboration, and continuous improvement are demonstrated to be critical components of effective project management. Their collective impact not only enhances the likelihood of meeting project goals but also ensures the sustainability and efficiency of construction outcomes.

In summary, Table 4.16 highlights the statistically significant role of TQM practices in the success of the Amahoro Stadium rehabilitation project. The high F-statistic and low residual variability emphasize the effectiveness of these practices in driving project outcomes. Construction firms and project managers should prioritize the integration of TQM principles to achieve similar success in future infrastructure projects.

Table 4.17: Coefficient

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	-1.962	.363		-5.399	.000
	Planning	.181	.065	.161	2.768	.006
	Assurance	.450	.076	.427	5.956	.000
	Control	.115	.029	.093	3.972	.000
	Collaboration	.365	.106	.329	3.456	.001

a. Dependent Variable: Amahoro Stadium rehabilitation project success

The analysis of Table 4.17 offers key insights into the role of Total Quality Management (TQM) components such as quality planning, quality assurance, quality control, and communication and collaboration on the successful completion of the Amahoro Stadium rehabilitation project. The table presents the unstandardized and standardized coefficients for each predictor, alongside the corresponding t-values and significance levels, which are used to test the impact of these factors on project success. The results allow for the testing of specific hypotheses regarding the significance of each TQM practice in the project's overall success.

The constant term in the model is B=−1.962, with a p-value of 0.000, indicating a statistically significant baseline value for the project's success in the absence of TQM practices. This negative constant implies that without the influence of the predictors, the project's success would be significantly lower. The unstandardized coefficients for the TQM practices reflect how much each factor contributes to the project's success when all other factors are held constant.

Starting with quality planning, the unstandardized coefficient is B=0.181, with a t-value of 2.768 and a significance level of p=0.006. This demonstrates that quality planning has a statistically significant positive effect on the success of the Amahoro Stadium project. Specifically, for each unit increase in quality planning, the project's success increases by 0.181 units. The standardized coefficient of β=0.161\beta = 0.161β=0.161 indicates that quality planning contributes moderately to the project's overall success. Given these findings, the null hypothesis H_{01} which states that there is no significant effect of quality planning practices on project success is rejected, confirming that quality planning is an important factor.

The next TQM practice, quality assurance, shows a much stronger influence on project success. With an unstandardized coefficient of B=0.450B, a t-value of 5.956, and a highly significant p-value of 0.000, quality assurance has a large positive effect on the project's success. For each unit increase in quality assurance, project success increases by 0.450 units. The standardized coefficient of β=0.427 highlights quality assurance as the most influential predictor among the variables in the model. Therefore, the null hypothesis H_{02} , which posits that there is no significant effect of quality assurance practices on project success, is rejected, further confirming the crucial role of quality assurance in ensuring successful project outcomes.

Quality control also plays a significant role in the project's success, though with a somewhat smaller effect. The unstandardized coefficient for quality control is B=0.115B, with a t-value of 3.972 and a p-value of 0.000, signifying a statistically significant positive effect. For each

unit increase in quality control, project success improves by 0.115 units. The standardized coefficient of β=0.093 indicates that while the effect of quality control is smaller compared to quality assurance and communication and collaboration, it still significantly contributes to project success. As a result, the null hypothesis H_{03} which asserts that quality control has no significant effect on project success is rejected.

Communication and collaboration, another key aspect of TQM, also significantly influences the success of the project. The unstandardized coefficient is B=0.365, with a t-value of 3.456 and a p-value of 0.001, indicating a positive and statistically significant relationship with project success. Each unit increase in communication and collaboration contributes 0.365 units to the project's success. The standardized coefficient of β=0.329 shows that communication and collaboration are the second most influential predictor in the model, following quality assurance. The null hypothesis H_{04} , which proposes that communication and collaboration have no significant effect on project success, is also rejected.

In conclusion, the analysis of Table 4.17 clearly demonstrates that all TQM practices quality planning, quality assurance, quality control, and communication and collaboration have statistically significant positive effects on the success of the Amahoro Stadium rehabilitation project. Quality assurance stands out as the most influential predictor, followed by communication and collaboration, quality planning, and quality control. These findings highlight the importance of integrating comprehensive TQM practices to achieve successful outcomes in construction projects. By rejecting all four null hypotheses, the results emphasize the necessity of adopting and effectively implementing TQM principles to ensure that infrastructure projects in Rwanda, such as the Amahoro Stadium rehabilitation, meet high standards of quality, sustainability, and success.

4.5. Discussion

The analysis of the Amahoro Stadium rehabilitation project provides significant insights into the relationship between quality management practices and project success. The various tables in the study offer statistical evidence supporting the effectiveness of quality planning, quality assurance, quality control, communication and collaboration, and continuous improvement in achieving project objectives.

Descriptive statistics summarize the respondents' perceptions regarding the quality management practices implemented in the Amahoro Stadium project. The mean values for quality planning, quality assurance, quality control, communication and collaboration, and

continuous improvement practices indicate generally favorable perceptions among stakeholders. This suggests a positive outlook on the effectiveness of these practices in contributing to project success. For instance, a high mean value for quality assurance indicates that stakeholders believed quality assurance activities were effectively carried out, which aligns with the findings of Jha & Iyer (2019), who emphasized that quality assurance processes significantly mitigate risks associated with project delays and defects, thus leading to improved project performance.

The model summary (Table 4.15) demonstrates a strong relationship between the predictors—quality planning, quality assurance, quality control, communication and collaboration, and continuous improvement and the dependent variable, Amahoro Stadium rehabilitation project success. The RRR-value of 0.989 suggests an exceptionally strong correlation, while the R2R^2R2 value of 0.979 indicates that approximately 98% of the variance in project success can be explained by the combined effects of these quality management practices. The Adjusted R2R^2R2 value of 0.978 reinforces this finding, accounting for the number of predictors in the model. The F-change value of 1603.208 with a significance level of 0.000 further supports the statistical significance of the model, implying that quality management practices collectively contribute to the success of the project. These findings align with research conducted by Alsharif et al. (2021), who found that effective quality management practices significantly enhance project performance by reducing rework and increasing efficiency throughout the project lifecycle. Their study highlighted that organizations prioritizing quality management are better positioned to achieve project objectives within budget and schedule constraints.

The ANOVA results (Table 4.17) further validate the model's significance, with a regression sum of squares of 3776.633 and a residual sum of squares of 81.860. The F-statistic of 1602.984, with a significance level of 0.000, indicates that the overall model is statistically significant. This confirms that the predictors such as quality planning, quality assurance, quality control, communication and collaboration, and continuous improvement have a meaningful impact on the success of the Amahoro Stadium rehabilitation project. The high proportion of variance explained by the regression model emphasizes the importance of quality management practices in enhancing project outcomes, consistent with findings from Gajendran et al. (2020). Their research showed that implementing systematic quality management frameworks led to a notable increase in stakeholder satisfaction and project success rates. They argued that quality practices act as a foundation for continuous improvement, ultimately driving project excellence.

The coefficients analysis (Table 4.16) provides specific insights into the individual contributions of each quality management practice. For quality planning, the unstandardized coefficient of 0.181 with a significance level of 0.006 highlights the significant positive effect of quality planning practices on project success. This suggests that establishing a comprehensive quality plan early in the project lifecycle is crucial for defining quality objectives and standards. This finding is supported by Tserng et al. (2022), who emphasized that quality planning serves as a blueprint for project execution, allowing for more effective resource allocation and risk management. Their research found that projects with robust planning processes were more likely to meet their objectives and adhere to timelines and budgets.

In terms of quality assurance, the unstandardized coefficient of 0.450 with a significance level of 0.000 indicates a strong positive impact on project success. This suggests that systematic approaches to ensuring compliance with quality standards are vital in reducing defects and enhancing overall project quality. The results are consistent with previous research by Ng et al. (2023), who noted that organizations implementing rigorous quality assurance processes reported fewer defects and higher client satisfaction. Their study highlighted that thorough quality assurance checks minimize rework and foster trust and transparency between project teams and stakeholders.

Regarding quality control, the unstandardized coefficient of 0.115 with a significance level of 0.000 illustrates the importance of quality control practices in maintaining high standards throughout the construction process. Regular inspections and prompt corrective actions are essential for addressing quality issues and ensuring project success. This finding corroborates the work of Khamis et al. (2021), which established that effective quality control mechanisms significantly reduce non-compliance issues and enhance the quality of deliverables. Their research underscored the importance of continuous monitoring and documentation to improve project outcomes and stakeholder confidence.

Lastly, the coefficient of 0.365 with a significance level of 0.001 demonstrates the critical role of effective communication and collaboration among stakeholders. Establishing clear channels of communication and fostering a culture of teamwork are integral to addressing quality-related concerns and improving project performance. This finding aligns with research by Lehtonen and Martinsuo (2020), who highlighted that effective communication and collaboration enhance stakeholder engagement and project success. Their study revealed that projects

characterized by high levels of stakeholder involvement in decision-making processes were more likely to achieve their objectives, as clear communication facilitates prompt problem-solving and fosters a sense of ownership among stakeholders.

In conclusion, the statistical analyses presented in the tables indicate a robust relationship between quality management practices and the success of the Amahoro Stadium rehabilitation project. The model summary, ANOVA results, and coefficients analysis collectively affirm that implementing effective quality planning, assurance, control, and communication practices significantly contributes to achieving project objectives. These findings underscore the importance of prioritizing quality management practices in construction projects to enhance outcomes and stakeholder satisfaction, reinforcing insights from recent studies in the field.

4.6. Quality content analysis from the interview

From the quality content analysis, insights gathered from the project manager and the officer from MINISPORT shed light on various aspects of the Amahoro Stadium expansion project, particularly in relation to planning, execution, and stakeholder engagement. The project manager described the planning and design phase as a critical period that involved thorough preparation and collaboration with various stakeholders. Engaging stakeholders early helped establish a clear project scope and design, which facilitated smoother execution. However, challenges arose in coordinating these stakeholders, leading to occasional misunderstandings and misaligned expectations. The MINISPORT officer supported this view, emphasizing that while the planning phase was largely successful, ongoing communication could have been enhanced to minimize confusion.

Regarding the project timeline, the project manager indicated that the expansion mostly adhered to the initial schedule, with only minor delays attributed to unexpected weather conditions and supply chain disruptions. The MINISPORT officer corroborated this perspective, stating that although the initial timeline was ambitious, the team effectively managed delays. The project manager highlighted key factors that contributed to maintaining the project schedule, such as effective risk management and proactive planning, while also acknowledging that more robust contingency planning could have mitigated delays further.

The management of resources was another critical area discussed. The project manager pointed out the need to balance human resources and materials effectively. While most resources were managed efficiently, there were instances of material shortages that required immediate attention. The MINISPORT officer mentioned that these challenges prompted the team to seek alternative suppliers, which helped address the issues without significantly impacting the

project timeline. Both interviewees agreed that ongoing resource monitoring and flexible allocation strategies were crucial for overcoming these challenges.

Quality assurance and control were key components of the expansion project. The project manager explained that a rigorous quality management system was implemented, including regular inspections and adherence to established standards. However, some quality issues did arise, particularly regarding workmanship in certain areas. These were addressed through corrective measures, such as retraining personnel and enhancing oversight during construction. The MINISPORT officer expressed satisfaction with the overall quality of the final stadium, noting that it met most of the expectations set at the project's inception. Still, they acknowledged some shortcomings in certain facility aspects, leading to a commitment to continuous improvement in future projects.

Communication and collaboration among stakeholders played a vital role in the project's success. The project manager noted effective communication channels were in place, although challenges emerged in aligning the diverse interests of stakeholders, including government officials, contractors, and community representatives. The MINISPORT officer emphasized that regular meetings facilitated information sharing but suggested that implementing more structured communication protocols could enhance collaboration further. They also noted that fostering a culture of open communication among all parties could lead to quicker issue resolution and better project outcomes.

Stakeholder engagement was another focal point of the discussions. The project manager reported that stakeholders' expectations were generally addressed, with efforts made to incorporate feedback into project decisions. Successful engagement examples included community meetings to inform residents about developments and gather input. However, the MINISPORT officer pointed out that some stakeholder concerns were not fully addressed, particularly regarding potential disruptions during construction. They advocated for more inclusive engagement strategies in future projects to ensure all voices are heard.

Finally, both interviewees reflected on significant challenges and failures encountered during the project. The project manager mentioned that miscommunications at various stages led to delays and dissatisfaction among some stakeholders. They acknowledged that better planning and a more systematic approach to stakeholder engagement could have alleviated some of these issues. The MINISPORT officer echoed this perspective, noting that lessons learned from the Amahoro Stadium expansion could inform future projects, particularly in enhancing communication strategies and stakeholder involvement. By prioritizing these areas, they believe that future projects could achieve even greater success and stakeholder satisfaction.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.0. Introduction

This chapter contains the researcher's conclusions and recommendations; in conclusion, the researcher summarizes the important findings and draws conclusions.

5.1. Summary of major findings

This section presents a summary of the findings from the analysis of the Amahoro Stadium construction project, focusing on four key objectives: the effects of quality planning practices, quality assurance practices, quality control practices, and communication and collaboration practices on the overall success of the project. By evaluating these dimensions, the analysis aims to highlight the critical factors contributing to the success of the Amahoro Stadium expansion and to identify areas for improvement in future projects.

5.1.1. Effect of Quality Planning Practices on Amahoro Stadium Construction Success

The findings from the study indicate that quality planning practices significantly contributed to the success of the Amahoro Stadium construction project. The statistical analysis revealed a positive relationship between quality planning practices and project success, suggesting that improvements in quality planning directly enhanced the project's outcomes. The project manager emphasized the importance of engaging stakeholders during the planning and design phases, which facilitated the establishment of clear objectives and a well-defined project scope. While effective quality planning enabled the team to anticipate challenges and implement strategies to mitigate risks, occasional miscommunications and misunderstandings among stakeholders were identified as areas for improvement.

Overall, the evidence suggests that robust quality planning was integral to the project's success, providing a strong foundation for subsequent phases. Additionally, the findings from the quality assurance assessment reinforced the project's commitment to systematic approaches, particularly in handling non-conformances and maintaining regular communication with stakeholders. Although these practices were positively perceived, there remains an opportunity to enhance independent audits and training on quality assurance processes. By addressing these areas, future projects can further strengthen their quality assurance frameworks and improve overall project outcomes, emphasizing the critical role of both quality planning and assurance within the Total Quality Management framework.

5.1.2. Effect of Quality Assurance Practices on Amahoro Stadium Construction Success

Quality assurance practices played a crucial role in ensuring that the Amahoro Stadium expansion met the expected standards. The analysis revealed a strong positive effect of quality assurance practices on project success, indicating that enhanced quality assurance measures correspondingly increased project outcomes. Both the project manager and the MINISPORT officer emphasized the implementation of a rigorous quality management system, which included regular inspections and adherence to established standards. While some quality issues arose during construction, they were promptly addressed through corrective measures, such as retraining personnel and enhancing oversight. The final output of the project met most of the quality expectations set at the beginning, highlighting the effectiveness of quality assurance practices in maintaining high standards throughout the construction process. This underscores the critical importance of robust quality assurance in supporting the overall success of the project.

5.1.3. Effect of Quality Control Practices on Amahoro Stadium Construction Success

Quality control practices were critical in identifying and resolving issues during the construction of the Amahoro Stadium. The statistical findings revealed a significant positive correlation between quality control and construction success, indicating that effective quality control measures contributed to better project outcomes. The project manager reported that systematic quality control practices, including regular inspections and the use of quality checklists, were employed to ensure compliance with standards. Although some non-compliance issues were identified, they were addressed effectively, minimizing their impact on the overall project timeline and outcomes. The successful implementation of quality control practices played a key role in delivering a high-quality final product, reinforcing the importance of quality control in achieving project success.

5.1.4. Effect of Communication and Collaboration Practices on Amahoro Stadium Construction Success

Communication and collaboration among stakeholders were identified as essential factors influencing the success of the Amahoro Stadium project. The statistical analysis indicated a positive relationship between communication and collaboration practices and project success, suggesting that improved communication contributed to better project outcomes. The project manager acknowledged that while effective communication channels were established, challenges persisted in aligning the diverse interests of various stakeholders.

Regular meetings facilitated information sharing, but there was a need for more structured communication protocols to enhance collaboration. The MINISPORT officer emphasized the value of open communication in resolving issues promptly and fostering a positive project environment. Overall, the findings suggest that enhancing communication and collaboration practices could lead to more efficient problem-solving and greater stakeholder satisfaction in future projects.

5.2. Conclusion

The Amahoro Stadium expansion project serves as a notable case study in the application of total quality management (TQM) principles and their impact on project success. Through the systematic analysis of quality planning, quality assurance, quality control, and communication and collaboration practices, this study has demonstrated that these elements are crucial for achieving successful project outcomes.

The findings reveal that effective quality planning laid a solid foundation for the project, facilitating clear objectives and stakeholder engagement. Quality assurance measures played a vital role in maintaining high standards throughout the construction process, addressing quality issues promptly, and ensuring compliance with established criteria. Additionally, the emphasis on quality control practices helped identify and rectify problems in real-time, safeguarding the project's integrity and outcomes. Lastly, the importance of communication and collaboration among stakeholders highlighted the necessity of fostering a cooperative environment that enhances decision-making and problem-solving.

In conclusion, the Amahoro Stadium project exemplifies how integrating comprehensive quality management practices can lead to successful project execution. While the project achieved its objectives, the findings also suggest areas for improvement, particularly in stakeholder engagement and communication strategies. By leveraging these insights, future projects can further enhance their performance and outcomes, ultimately contributing to the broader goals of sustainable and effective infrastructure development in Rwanda and beyond. The lessons learned from this project can serve as a valuable guide for practitioners and policymakers aiming to improve the quality and success of construction initiatives in similar contexts.

5.3. Recommendations

Based on the shortcomings identified in the Amahoro Stadium expansion project, the following recommendations are proposed to enhance future projects:

5.3.1. Quality planning practices and Amahoro Stadium construction success

The project faced challenges in clearly defining quality objectives, resource allocation, and managing risks, leading to inefficiencies and delays. To address these issues, enhance stakeholder engagement by involving them in the planning process through structured workshops and feedback sessions. Additionally, conduct regular risk assessments during the planning phase to identify potential challenges and mitigate them proactively, ensuring better alignment of resources and objectives.

5.3.2. Quality assurance practices and Amahoro Stadium construction success

Inadequate adherence to quality standards and inconsistent process documentation negatively impacted project consistency and outcomes. Implement comprehensive training programs for the project team on quality assurance principles to ensure compliance with standards, effective documentation, and a shared understanding of quality expectations. Furthermore, leverage technology for quality management to monitor processes in real time and maintain high standards throughout the project lifecycle.

5.3.3. Quality control practices and Amahoro Stadium construction success

Deficiencies in inspections, defect management, and process monitoring resulted in quality lapses and delays in addressing problems. Utilize technology for quality control practices, such as inspection and defect tracking tools, to streamline processes and ensure timely interventions. Additionally, regular risk assessments should be conducted during quality control activities to proactively identify and resolve defects before they escalate.

5.3.4. Communication and collaboration practices affect construction success?

Poor communication protocols and insufficient stakeholder collaboration led to misunderstandings, delays, and inefficiencies in decision-making. Strengthen communication protocols by defining roles and responsibilities clearly and ensuring regular updates using collaborative tools. Enhance stakeholder engagement by organizing frequent feedback sessions and fostering active participation, ensuring alignment of objectives and effective problem-solving throughout the project lifecycle.

By addressing these recommendations, future projects can build on the successes of the Amahoro Stadium expansion while mitigating the shortcomings identified in this study, ultimately leading to improved project outcomes and stakeholder satisfaction.

5.4. Further research

The researcher acknowledges that the exploration of total quality management remains an evolving field with numerous dimensions yet to be fully explored. Here are four proposed

topics that could complement the study on the Amahoro Stadium expansion project and contribute to a deeper understanding of total quality management in construction:

- ✓ The Influence of Project Management Practices on Construction Succes
- ✓ Examining the Effect of Leadership Styles on Team Performance in Construction Projects
- ✓ Assessing the Impact of Environmental Sustainability Practices in Construction
- ✓ Exploring the Role of Innovation in Enhancing Efficiency in the Construction Sector

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APPENDICES

QUESTIONNAIRE

Introductory letter

Dear respondent

I, Larry Daniel Kaetu-Smith student at University of Kigali. As part of my requirement for the Degree award of Master's in Project Management, I have to present a dissertation. The study is all about, **"**Total Quality Management integration in construction project success in Rwanda. Case study Amahoro stadium".

I am now on field to collect information for this dissertation and you are kindly requested to respond to the various questions in the questionnaire attached. I humbly request your contribution by answering this questionnaire, promising that, the information you will provide is treated with higher confidentiality and used solely for academic purposes.

Thank you in advance for your cooperation

Thank you.

a. Identification of respondents

1. Gender: Male ☐ Female ☐
2. Marital status: single ☐ Married ☐
3. Level of education:
   - Secondary year ☐
   - Bachelor's degree ☐
   - Master's degree: ☐
   - PhD degree: ☐
   - Other (please specify): _____
4. Age: 18-25 ☐ 26-35 ☐ 36-45 ☐ 46 -55 ☐ 56-65 ☐

b. Assessment of total quality management during Amahoro Stadium rehabilitation

What is your level of agreement with the following statements that relate to total quality management during Amahoro Stadium rehabilitation? (5-strongly agree, 4- agree, 3-neutral, 2-disagree, 1-strongly disagree)

	Quality Planning	**5**	**4**	**3**	**2**	**1**
1	The Amahoro Stadium project had a documented quality plan that outlined quality objectives and standards.					

2	Quality planning activities were conducted at the early stages of the Amahoro Stadium project.					
3	Stakeholders were involved in the quality planning process for the Amahoro Stadium project.					
4	The quality plan for the Amahoro Stadium project included specific criteria for material and workmanship standards.					
5	Regular updates and reviews of the quality plan were conducted throughout the Amahoro Stadium project.					
6	Risk management was integrated into the quality planning process for the Amahoro Stadium project.					
	Quality Assurance	**5**	**4**	**3**	**2**	**1**
1	The Amahoro Stadium project employed systematic processes to ensure quality requirements were met.					
2	Quality assurance activities were conducted at each phase of the Amahoro Stadium project lifecycle.					
3	Independent audits and inspections were performed to verify quality standards in the Amahoro Stadium project.					
4	There was a clear procedure for handling non-conformances corrective actions in the Amahoro Stadium project.					
5	Staff received training on quality assurance processes and standards for the Amahoro Stadium project.					
6	Quality assurance reports were regularly communicated to stakeholders in the Amahoro Stadium project.					
	Quality Control	**5**	**4**	**3**	**2**	**1**
1	Regular inspections were conducted to ensure compliance with quality standards in the Amahoro Stadium project.					
2	Quality control tests were performed on materials and workmanship in the Amahoro Stadium project.					
3	There was a clear documentation process for quality control activities in the Amahoro Stadium project.					
4	Non-compliance issues were promptly addressed and rectified in the Amahoro Stadium project.					

5	The project team used checklists and other tools to monitor quality control in the Amahoro Stadium project.					
6	Feedback from quality control activities was used to make improvements in real-time during the Amahoro Stadium project.					
	Communication and Collaboration	**5**	**4**	**3**	**2**	**1**
1						
2	There were established channels for effective communication among project stakeholders in the Amahoro Stadium project.					
3	Regular meetings were held to discuss quality-related issues progress in the Amahoro Stadium project.					
4	Collaboration tools were used to facilitate information sharing on quality matters in the Amahoro Stadium project.					
5	Stakeholders were promptly informed about any changes in quality plans or standards in the Amahoro Stadium project.					
6	There was a culture of open communication regarding quality concerns and suggestions in the Amahoro Stadium project.					
	The project encouraged teamwork and collaborative problem-solving for quality improvements in the Amahoro Stadium project.					

d. Opinions on Amahoro Stadium rehabilitation project success

What is your level of agreement with the following statements that relate to Amahoro Stadium rehabilitation project success? (1-strongly agree, 2- agree, 3-neutral, 4-disagree, 5-strongly disagree)

	Project Quality	**1**	**2**	**3**	**4**	**5**
1	The Amahoro Stadium rehabilitation project met all predefined quality standards.					
2	The materials used in the Amahoro Stadium rehabilitation project were of high quality and complied with specifications.					
3	The workmanship in the Amahoro Stadium rehabilitation project was consistently high throughout the construction process.					
4	Quality inspections during the Amahoro Stadium rehabilitation project identified and resolved issues promptly.					
5	The final output of the Amahoro Stadium rehabilitation project was free of major defects.					

6	Stakeholders were satisfied with the quality outcomes of the Amahoro Stadium rehabilitation project.					
	Project Timeliness	**1**	**2**	**3**	**4**	**5**
1	The Amahoro Stadium rehabilitation project was completed within the planned timeline.					
2	There were minimal delays in the Amahoro Stadium rehabilitation project due to effective project management.					
3	Milestones in the Amahoro Stadium rehabilitation project were achieved as scheduled.					
4	Any delays in the Amahoro Stadium rehabilitation project were communicated and managed effectively.					
5	The project team for the Amahoro Stadium rehabilitation adhered to the timeline without compromising quality.					
6	The Amahoro Stadium rehabilitation project timeline was realistic and well-planned from the outset.					
	Project Budget Adherence	**1**	**2**	**3**	**4**	**5**
1	The Amahoro Stadium rehabilitation project was completed within the allocated budget.					
2	Budgetary controls in the Amahoro Stadium rehabilitation project were effectively implemented.					
3	Cost overruns in the Amahoro Stadium rehabilitation project were minimized and well-managed.					
4	The project team for the Amahoro Stadium rehabilitation regularly reviewed and adjusted the budget as necessary.					
5	Financial resources for the Amahoro Stadium rehabilitation project were efficiently utilized.					
6	Stakeholders were informed about budget status throughout the Amahoro Stadium rehabilitation project.					
	Client Satisfaction	**5**	**4**	**3**	**2**	**1**
1	Clients were satisfied with the final outcomes of the Amahoro Stadium rehabilitation project.					
2	The project team for the Amahoro Stadium rehabilitation effectively addressed client needs and expectations.					

3	Communication with clients during the Amahoro Stadium rehabilitation project was clear and consistent.					
4	Feedback from clients during the Amahoro Stadium rehabilitation project was promptly acted upon.					
5	The Amahoro Stadium rehabilitation project delivered value as perceived by the clients.					
6	Clients expressed a willingness to work with the project team again based on their experience with the Amahoro Stadium rehabilitation.					
	Project Success	**5**	**4**	**3**	**2**	**1**
1	The Amahoro Stadium rehabilitation project achieved its stated goals and objectives.					
2	Stakeholders consider the Amahoro Stadium rehabilitation project a success.					
3	The Amahoro Stadium rehabilitation project had a positive effect on the local community.					
4	Lessons learned from the Amahoro Stadium rehabilitation project were documented for future use.					
5	The project team for the Amahoro Stadium rehabilitation felt supported and empowered throughout the project.					
6	The Amahoro Stadium rehabilitation project is seen as a benchmark for future projects in Rwanda.					

Thank you for your cooperation

INTERVIEW GUIDE

1. Can you describe the planning and design phase of the Amahoro Stadium expansion project? What aspects of this phase went well, and what challenges were encountered?
2. How well did the project adhere to the initial timeline? Were there any major delays or disruptions during the expansion, and what were the primary causes of these delays?
3. In your opinion, what were the key factors that contributed to maintaining the project schedule, and what could have been done differently to avoid delays?
4. How were resources (both materials and human resources) managed throughout the project? Were there any significant issues related to resource allocation, and how were they addressed?
5. How was quality assurance and control maintained during the expansion of Amahoro Stadium? Were there any quality issues that arose, and how were they resolved?
6. Did the final expanded stadium meet the quality standards and expectations set at the beginning of the project? If not, what were the main shortcomings, and what lessons were learned?
7. How effective was communication and collaboration among the various stakeholders involved in the project (e.g., project managers, contractors, government officials, and the community)? What worked well, and what could have been improved?
8. Were stakeholders' expectations and concerns adequately addressed throughout the project? Can you provide examples of successful stakeholder engagement or areas where improvement was needed?
9. Conversely, what were the most significant challenges or failures encountered during the project, and what lessons were learned that could benefit future projects of similar scale and nature?