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PROJECT CONTROL AND PROJECT SUSTAINABILITY IN WATER SERVICE REGULATORY BOARD NAIROBI COUNTY, KENYA

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Abstract

Project sustainability is crucial in facilitating successful project implementation and termination, and additionally to stimulate an organization's success. Sustainability aids in risk mitigation, assessment, and management, and it also enhances project quality. Project sustainability consists of the merging and balancing of economic, social, and environmental aspects in a project. The main objective of this study was to examine the influence of project control on project sustainability in WASREB Nairobi County, Kenya. Specifically, the study sought to examine the influence of project risk management and project quality. The objectives were attached to related theories: Enterprise risk management theory and Total quality management. The target population consisted of the upper-middle managers, middle managers, and operational managers totaling to 57. Due to the number of population, the researcher used census. The research instrument was authenticated through a pilot study, which was evaluated by the supervisor. The study used primary data, and was collected through the employment of semi-structured questionnaires. Secondary data was obtained from reports available at WASREB and published data. The study employed descriptive research design. Data collected was analyzed through the use of Statistical Package for Social Sciences (SPSS version 26). Multiple regression model was applied to inspect the direction and strength of influence of the independent variables on the dependent variable. Data was presented in tables, charts, and figures. The study concludes that project risk management has a positive and significant effect on project sustainability in Water service Regulatory Board Nairobi County, Kenya. In addition, the study concludes that project quality has a positive and significant effect on project sustainability in Water service Regulatory Board Nairobi County, Kenya. Based on the findings, the study recommends that the management of Water service Regulatory Board in Nairobi County should implementation of a robust risk management framework that emphasizes continuous stakeholder engagement. By actively involving stakeholders in the risk assessment and mitigation processes, the board can ensure that potential risks are identified early and addressed collaboratively.

Keywords: *Project Control, Project Risk Management, Project Quality, Sustainability in Water Service Regulatory Board*

INTRODUCTION

The attainment of goals set in a project needs efficient project control (Kivilä et al., 2021). According to Vanhoucke (2022), project control refers to measuring the performance of a project throughout its progression and using the information to monitor, update, and take corrective actions in the instance of problems. Kivilä *et al*. (2021) state that project control is a crucial part of the project execution phase and a significant issue during the project life cycle. It can be explained as encouraging desirable behavior to achieve an organization's objectives. Achieving a project's goals during implementation typically relies on defining clear performance measures and verifying them through project control (Mansur, Hamid, & Yusof, 2022).

The design of a project control system is a crucial segment of the project management effort. The project control process should always be functional and active more so during the implementation stage (Bahaudin, *et al.*, 2022). Most studies dedicated to project control models and techniques development have largely developed computer based project control systems that incorporate quantitative project management concepts like earned value analysis (Olawale & Sun, 2019). A usual inspiration for these studies is the drive to make project control models more easy to apply and use in practice and the need for integration for example by developing models that integrate schedule, cost, and resource information to achieve efficiency.

Sustainable project management is the planning, monitoring and controlling of project delivery and support processes, in consideration of the economical, social, and environmental aspects of the lifecycle of the project's processes, effects, resources, deliverables and effects, focusing on the achievement of benefits for stakeholders, and performing project activities in a transparent, ethical, and fair way and that is stakeholder participation driven (Silvius & Schipper, 2019). Project sustainability is progressively becoming a crucial aspect in delivering projects (Gareis *et al*., 2019). It has become an important project goal accompanying other dimensions of benefits and value. Project stakeholders need economic efficiency, eco-friendliness, and ethicality from a project (Silvius *et al.*, 2022). The sustainability of the delivery process and deliverables are equally crucial as they may have huge economic, social and environmental impacts (Silvius & Schipper, 2020). Sustainable project management is to a greater extent relevant to projects that lead to enduring changes in a community and engage multiple stakeholders with different expectations. Project sustainability fosters treating social and environmental issues in a similar manner as economic factors when carrying out projects (Gareis *et al.*, 2022).

A study in UK by Olawale & Sun (2021) stated that developed countries are reportedly performing some regular project control activities, ranging from comprehensive national project control systems to basic project control in many countries. The study found that both consultants and contractors largely applied control methods on their projects. 93% of the contractors either always or frequently applied time control methods as compared to 80% of responding consultants. In cost control, 100% of contractors either always or frequently utilized cost control methods, and in equal measure 100% of consultants applied cost control in their projects. This confirms that construction professionals give greater focus to cost performance compared to time performance.

In Nigeria, many construction Projects have not been successful owing to the several financial and technical pressures of cost limit, value maximization, and quality. Akintayo & Onajite (2020) hinted that the Presidential panel's interim report on contracts at the beginning of the then democratic government in Nigeria affirmed a sum of more than 450 billion naira under projects that can be categorized as failed contracts, as from the year 1979 to 1998. This could be

explained by most of the professional firms engaged in project control and administration don't have adequate control inputs in both qualitative and quantitative terms.

Musya (2022) examined the role of internal control systems, with an aim of determining the impact internal controls have on revenue collection in Kenya's county governments. The study concluded that county governments should acknowledge the contributions of internal control systems and that they should use internal control systems in their day to day operations to ensure that revenue collected matches the goal set. The study further recommended that internal control systems be put in place by the county governments in order to actualize set targets with ease.

Statement of the Problem

Project sustainability is crucial in facilitating the successful implementation and completion of projects, as well as to foster the success of the organization (Okeniyi, 2022). Sustainability aids in risk mitigation, assessment, and management, and it also enhances project quality (Okeniyi, 2019). Kenya's renewable water resources have in general been approximated as scarce (Wasreb, 2014). According to the ministry of water, sanitation and irrigation (2021), safe and clean water was accessed by 63% of Kenyans while reasonable standards of sanitation services were accessed by 26% of Kenyans. The current sanitation in Kenya is at 93% while the target based on vision 2030 is 100% coverage (Wasreb, 2023).

Under Vision 2030 the policy goal is to increase water coverage to 100% (National Water Master Plan, 2030). Similarly, by 2030, the Ministry of water, sanitation, and irrigation in Kenya aims to achieve universal access targets for Water Supply and Sanitation (WSS) services which include ensuring 100% access to water in both urban and rural water supply services, and for sanitation, 40% access to sewerage in urban areas and 100% access to improved sanitation facilities near households in rural areas (Wasreb, 2024).

Project control in state owned institutions plays a critical role in efforts towards national development. The mandate is to build capacity and ability in promoting national development. Thes may be achieved through risk management, managing scope, quality and resource management. Risk management offers an outlook of the risks an organization will encounter in the coming future years, and this information and tools can be applied longer-term to contribute to sustainability (Silvius, 2018).

Quality project processes that support schedule, cost, environmental, and social constraints establish project sustainability, reduce waste, improve supplies, enhance efficiency, and subsequently cause the project to cost less than planned (Rose, 2022). Effective scope management in a project leads to an easy and successful management of a project's constraints and critical success factors like time, cost, quality, social impact, environmental impact, amongst others (Mizra *et al*. (2022).

Integrating sustainability into project resource management is essential for achieving long-term project success. By optimizing the use of materials, labor, and energy, project resource management can significantly reduce resource waste and lower the environmental impact of a project. This approach aligns with sustainability by conserving resources and reducing the carbon footprint (Soares et al., 2024). Sustainable project resource management includes engaging stakeholders to understand their environmental and social expectations. This collaborative approach encourages stakeholder buy-in and fosters sustainable project outcomes (Armenia *et al*., 2021). Owing to the above issues the researcher would like to examine the influence of project control on project sustainability in Water Service Regulatory Board Nairobi County, Kenya.

Research Objectives

General Objective

The general objective of this study was to examine the influence of project control on project sustainability in Water Service Regulatory Board Nairobi County, Kenya.

Specific Objectives

i. To establish the influence of project risk management on project sustainability in Water service Regulatory Board Nairobi County, Kenya.
ii. To determine the influence of project quality on project sustainability in Water service Regulatory Board Nairobi County, Kenya.

Theoretical Review

Enterprise Risk Management Theory

Risk management is part and parcel of decision-making in companies and can be traced to the late 1940s and early 1950s. Originating from the mid-1990s, enterprise risk management came up as a management function and concept within organizations. The Committee of Sponsoring Organizations of the Treaway Commission (COSO) originally set up a pyramid shaped enterprise risk management model in 1992 to evaluate existing controls (Dickinson, 2001). According to Quon, Zeghal, & Maingot (2019) an organization can manage risk in two distinct ways; handling risks one by one on a largely decentralized and compartmentalized basis or viewing risks all together based on a strategic and coordinated structure. The latter method is the basis of Enterprise risk management theory.

ERM also proposes the positioning of risk management along the general corporate strategy and corporate governance (McShane, 2018). Quon *et. al*. (2012) suggest that companies that are able to create an efficient enterprise risk management have a long-run distinguishing feature compared to those manage and monitor risks one at a time. He also argues that managing and measuring risks systematically and consistently, and giving the project managers incentives and information to optimize the trade-off between return and risk strengthens the potential of a company to execute its strategic plan. Under ERM theory , interdependencies and correlations between risks are understood and analyzed, Natural hedges are exploited and recognized, external and internal circumstances in evaluating risk portfolios are understood, a company's risk criteria is considered when considering strategic alternative to achieve targets, the CEO and board of directors greatly take part, capital is allocated to obtain the highest risk-adjusted return, risks are assigned to owners for accountability, and a single and comprehensive risk oversight culture and structure is used to deal with all risk types (Olayinka *et al*., 2022).

The theory helps the project team evaluate the event of new risks that could be experienced and hadn't been recorded prior in the project. According to Horvey & Ankamah (2020), the ERM theory helps the project team to recognize new risks, monitor the recognized risks, and manage them through several response strategies like avoiding, acceptance of risks, or mitigation. This aids in risk monitoring because it entails using risk assessment so as to assess the impacts and probability of specific risks. It encourages often risk audits during the project lifecycle so as to evaluate and monitor their effect on the project and use of technical performance measurement to help the project managers track the project progress and develop strategies to respond to any risks that develop. Constant tracking of risk monitoring process is required to enable monitoring of the recognized risks and the appropriate response strategies to avoid schedule delays.

Total Quality Management

In 1950, W. Edwards Deming went to Japan to facilitate a statistical control methods course to Japanese executives and engineers, and this can be considered as the origin of Total Quality

Management (Dahlgaard-Park *et al.*, 2018). Fundamentally, it is founded on the principle that companies should consider the opinions of those that they serve, frequently analyze how efficiently they are acting on the requirements of their stakeholders, and start the change so as to meet and even surpass the expectations of these stakeholders. It puts focus on tools and processes that consider quality from the customers and interpret their requirements into corporate actions (Kandie, 2019). It is based on eight principles which are customer focus, process based approach, employee participation, systematic flow, integrated system, continuous efforts, relationship management, and fact-based decision making (Dahlgaard-Park *et al.*, 2018). The theory points out that the road to 'total quality' generally entails a clear definition of quality and setting standards that pertain quality, facilitating quality training for the whole organization, coming up with quality measures for the work operations and each company member, developing a system in order to take corrective action in cases where quality challenges occur, including healthy management practices in order to promote employee participation, and developing a company reward system and culture in order to imprint that quality is everybody's main concern.

Project performance could be described and gauged as meeting quality and quality of process amongst other factors. Total quality management model positively impacts project quality through influencing company operations, customer and employee engagement, meeting of customer expectations, amongst other ways and this subsequently influences project performance. Implementation of TQM facilitates leadership in providing necessary resources to meet new requirements coming from quality management systems. Its implementation also influences the decision of selecting qualified suppliers and certified suppliers for quality materials (Ibrahim & Daniel, 2019). It promotes creation of strategies and plans to achieve superior quality in a project and inspires the project team to efficiently and effectively use the resources available with quality excellence in mind (Ibrahim & Daniel, 2019).

Conceptual Framework

As specified by Imenda (2019), a conceptual framework is a representation of an 'integrated' way of looking at a problem. It showcases the anticipated relationship linking variables and describes relevant objectives for the research process and outlines their coming together to draw logical and sound conclusions.

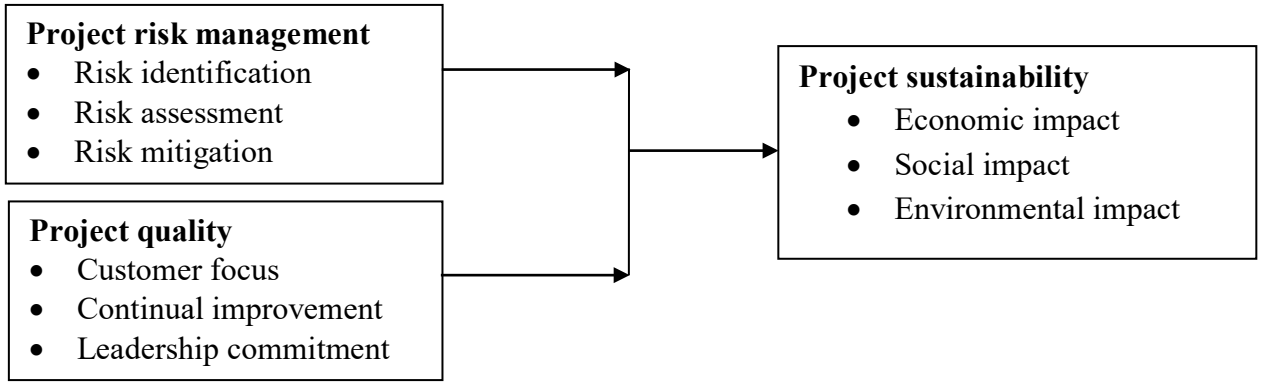

Figure 1: Conceptual Framework

Project Risk Management

Project Risk Management is the process of identifying, assessing, and controlling potential risks that could affect the successful outcome of a project (Hidayatno *et al*, 2020). It involves systematically identifying uncertainties that might impact the project's objectives, including

costs, timelines, quality, or scope. Risk identification is the first step in project risk management, where the focus is on identifying potential uncertainties and threats that could affect the project's success (Mguni, Herslund & Jensen, 2020). This process involves systematically reviewing all aspects of the project, including its scope, timeline, resources, and stakeholders. Methods such as brainstorming sessions, expert interviews, SWOT analysis (Strengths, Weaknesses, Opportunities, Threats), and risk checklists are commonly used to identify risks.

Risk assessment is the next step, which involves evaluating the identified risks to determine their potential impact on the project (Ihura & Kirima, 2024). This step includes analyzing the likelihood of each risk occurring and the severity of its potential consequences. Risks are typically ranked or categorized based on these two factors, often using a risk matrix or scoring system. High-priority risks are those with a high likelihood of occurring and significant impact, while low-priority risks may have minimal effects. Risk mitigation involves developing strategies and actions to reduce or eliminate the negative effects of identified risks (Hidayatno *et al*, 2020). The goal is to either prevent risks from occurring or minimize their impact if they do arise. Common mitigation strategies include risk avoidance (changing the project plan to eliminate the risk), risk reduction (taking actions to reduce the likelihood or impact of the risk), risk transfer (shifting the risk to a third party, such as through insurance or outsourcing), and risk acceptance (deciding to live with the risk and preparing contingency plans).

Project Quality

Project quality refers to the degree to which a project's outputs meet the defined standards, requirements, and stakeholder expectations (Ziv *et al*, 2020). It involves the consistent delivery of products or services that fulfill the specified objectives, while adhering to predetermined specifications, both in terms of performance and reliability. Achieving project quality requires a focus on quality planning, quality assurance, and quality control throughout the project lifecycle (Nwinyi *et al*, 2020). Customer focus is a core principle of quality management that emphasizes understanding and meeting the needs and expectations of customers (Macharia, Mbassana & Oduor, 2020). In the context of project management, this means ensuring that the project outputs not only align with the technical specifications but also deliver value and satisfaction to the customer or end user. It involves actively engaging with customers to gather feedback, understanding their requirements, and adjusting the project to better serve those needs.

Continual improvement refers to the ongoing efforts to enhance processes, products, and services throughout the course of a project and beyond (Muniu, Gakuu & Rambo, 2020). It is a commitment to always seeking ways to optimize performance, reduce waste, and increase efficiency. In project quality management, this concept is implemented by regularly assessing the project's performance, analyzing feedback, and making incremental changes to improve outcomes. Leadership commitment is crucial for ensuring that quality standards are upheld throughout a project (Nwinyi *et al*, 2020). Leaders play a pivotal role in setting the tone, culture, and direction for the project, particularly in fostering a commitment to quality. When project leaders demonstrate a strong dedication to quality—by allocating necessary resources, providing guidance, and maintaining a clear focus on customer needs—they inspire the team to adopt the same mindset.

Empirical Review

Project Risk Management and Project Sustainability

Hidayatno *et al* (2020) conducted a study on the effect of risk impact analysis on the investment of drinking water supply system development using project risk management in Indonesia. The purpose of this study is to obtain a financial risk model that maps potential risk factors and

calculates the financial impact of risks on the project. The study found that this is used to create alternative strategies to reduce the impact of risks on investment made during the development of the project. The study concluded that risk management is an essential action for the construction of a water supply system in South Bali.

Manirakiza *et al* (2020) conducted a study on the effect of risk management of new hydropower dams on the White Nile Cascade - A case study of Isimba & Karuma hydropower dams in Uganda. The development of dams is undoubtedly vital for the Uganda's socio-economic development; however, such dams could pose a high potential risk to the downstream communities. The study found that framework and approach is illustrated on Isimba & Karuma hydropower dams, currently under construction on the Victoria and Kyoga Nile Cascade in Uganda. Results indicate that the framework can be used to rank and prioritize risks amidst data scarce scenarios. In conclusion the decisions made have been based on the identified risks and priority of implementation is dependent on the level of likelihood and consequence

Wambua (2020) conducted a study on the effect of enterprise risk management on performance of water service providers in Kenya. The study of Enterprise Risk Management on water service providers is part of management strategic studies. The result of regression analysis showed that the three variables influenced the performance of water service providers. From this research, it was concluded that operational risk management, financial risk management and corporate risk management all have a significant positive effect on performance of water service providers in Kenya

Boru (2023) conducted a study on the effect of project management practices and sustainability of community managed water projects: a case of prepaid water kiosks projects in Saku – Marsabit, Kenya. The study was conducted in five prepaid water meter kiosks projects. The respondents of the study were the members of self-help groups running the five Kiosks, ministry of water officials within Marsabit County, and key informants within Marsabit County. The study found that fund management, stakeholder involvement, monitoring and evaluation and risk management had a positive and significant effect on sustainability of prepaid water meter kiosks project in Saku constituency in Marsabit County, Kenya. The study concluded that proper fund management ensures a systematic procedure, in which a project manager maintains, deploys, operated and upgrade assets in a cost-effective manner while they ensure successful sustainability of the project

Project Quality and Project Sustainability

Ziv *et al* (2020) conducted a study on the effect of water quality is a poor predictor of recreational hotspots in England. Maintaining and improving water quality is key to the protection and restoration of aquatic ecosystems, which provide important benefits to society. The study found that in only two of eight RBDs (North Umbria and Anglian) were both criteria met (positive association, strongest for fishing and swimming) when comparing to at least one of the null models. This conclusion is robust to variations in dataset size

Nwinyi *et al* (2020) conducted a study on the effect of review of drinking water quality in Nigeria: Towards attaining the sustainable development goal six. Access to potable water is a major problem confronting most developing nations particularly with the overwhelming health burden posed by polluted water and its sources. The study found that from their analysis of published literature, pre- and post- SDG implementation in Nigeria, it is clear that no significant progress has been made in providing potable water for all in Nigeria. The study concluded that looking at the available information from published literature, pre- and post- SDG

implementation in Nigeria, it is clear that no significant progress has been made in providing potable water for all in Nigeria.

Ibrahim (2020) conducted a study on the effect of sustainability assessment and identification of determinants in community-based water supply projects using partial least squares path model In Sudan. In the current paper, the sustainability of community-based water supply projects in four different states in Sudan was assessed using a set of multidimensional indicators. The results showed that although all analyzed projects were relatively young projects (1 to 4 years), all projects showed low sustainability performance. The study concluded that questioning the sustainability of CBWS projects in Sudan was investigated in the current study

Ochelle (2020) conducted a study on the effect of factors influencing sustainability of community water projects in Kenya: a case of water projects in Mulala division, Makueni County. The purpose of this study is to investigate the factors that influence sustainability of community water projects in semi-arid areas in Kenya with a focus in Mulala division. The findings of the study indicated that community participation, project financing, project management practices and community training do influence sustainability of community water projects. It was concluded that the factors investigated influences sustainability of community water projects in different ways

RESEARCH METHODOLOGY

Research design

This study adopted descriptive research design. The choice of this research design was made because both qualitative and quantitative elements are going to be used within the study. It calls for collection of quantitative data that can be arranged along a continuum in a numerical structure, or it can explain categories of data (Vogt et al., 2019).

Target population

In this study the population was employees of WASREB totaling to 57 and because the population is manageable the researcher used census method. Census as explained by Baffour, King, &Valente (2012), is the total count of every single unit in a population in the study area.

Data collection

During collection of data, a researcher chooses the type of data to gather, means of collecting it, from whom to gather the information from, and time to gather the information (Choy 2014). The research used both primary and secondary data. Based on Greenfield & Greener (2016) primary data is the information gathered right from first-hand events, without being exposed to any kind of processing. Secondary data describes the data a researcher gets from books, research articles, and publications (Mugenda & Mugenda, 2012). Creswell (2017) contends that the former can be gathered through the use of either quantitative data collection methods (questionnaires), qualitative data collection methods (interview guides, focus group discussions, and observations), or both. The study applied semi-structured questionnaires to gather primary data.

Pilot study

The primary objective of a pilot study is to proactively address potential challenges that may arise during the main survey (Hennink, Hutter & Bailey, 2020). As suggested by Mugenda and Mugenda (2012), the researcher should field-test the questionnaire upon completion to assess its and design appropriateness and accuracy. This process also aimed at enhancing the validity of the research instruments and design. By carrying out a pilot study, the researcher identified any weaknesses or limitations in the research design and instrument and make necessary revisions before commencing the actual study. It is recommended, as outlined by Hennink, Hutter &

Bailey (2020), that the pilot survey involve participants who will not be included in the main study. Mugenda and Mugenda (2012) propose a small pretest size of approximately 1-10% of the total population. Additionally, as noted by Karanja (2016), a pilot test helps the researcher refine their research questions. The researcher used 10 percent of 57. In this case it was 6 respondents.

Data analysis & presentation

Data analysis involves examining collected information to create discussions, conclusions, and inferences (Dubey and Kothari, 2022). Kombo and Tromp (2019) describe data analysis as the examination of data collected in a study to make deductions and inferences. Additionally, it encompasses a variety of processes and activities that a researcher applies on a database to draw conclusions and make decisions based on the information gathered from the study. Dubey and Kothari (2022) argue that data analysis includes summarizing large quantities of raw data, classifying, rearranging, and ordering information. Quantitative information from the study was processed using inferential and descriptive statistics, while qualitative information was processed through content analysis.

Data was analyzed using SPSS (v.26). The analysis was presented in ways of tables. The model that guided the study is Multiple Regression Model:

$Y= \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \epsilon$

Where Y= project sustainability, $_{\beta 0}$ = Constant β_1 and β_2 are Coefficients of project controls = error term

X_1 = project risk management

X_2 = project quality

ANALYSIS AND INTERPRETATION OF DATA

Descriptive Statistics

Project Risk Management and Project Sustainability

The first specific objective of the study was to establish the influence of project risk management on project sustainability in Water service Regulatory Board Nairobi County, Kenya. The respondents were requested to indicate their level of agreement and statements relating to risk management and project sustainability in Water service Regulatory Board Nairobi County, Kenya. The results were as presented in Table 1.

From the results, the respondents agreed that there are consideration of sustainability in risk identification (M=3.980, SD= 0.777). In addition, the respondents agreed that a risk preventive and mitigation strategy is deployed to minimize the impact of the negative project risks (M=3.959, SD= 0.676). Further, the respondents agreed that quantitative and qualitative risk analysis is useful in the risk assessment (M=3.898, SD= 0.621).

The respondents also agreed that positive risks are exploited for the advantage of the project (M=3.837, SD= 0.657). Further, the respondents agreed that identified risks are assessed to establish the timeframe, impact and likelihood of occurrence (M=3.837, SD= 0.717). The respondents also agreed that potential project risks events throughout its lifecycle are identified and documented (M=3.796, SD= 0.676).

Table 1: Project Risk Management and Project Sustainability

	Mean	Std. Deviation
Risk identification		
Potential project risks events throughout its lifecycle are identified and documented	3.796	0.676

There are consideration of sustainability in risk identification	3.980	0.777
Risk assessment		
Identified risks are assessed to establish the timeframe, impact and likelihood of occurrence	3.837	0.717
Quantitative and qualitative risk analysis is useful in the risk assessment	3.898	0.621
Risk mitigation		
Positive risks are exploited for the advantage of the project.	3.837	0.657
A risk preventive and mitigation strategy is deployed to minimize the impact of the negative project risks.	3.959	0.676
Aggregate	**3.885**	**0.687**

Project Quality and Project Sustainability

The second specific objective of the study was to determine the influence of project quality on project sustainability in Water service Regulatory Board Nairobi County, Kenya. The respondents were requested to indicate their level of agreement on the statements relating to project quality and project sustainability in Water service Regulatory Board Nairobi County, Kenya. The results were as shown in Table 2.

From the results, the respondents agreed that all critical processes are documented and updated (M= 4.143, SD= 0.736). In addition, the respondents agreed that there is incorporation of quality principles into everyday operations and strategies (M=4.041, SD= 0.676). Further, the respondents agreed that everyone in the organization has a strong understanding on the customers, suppliers, and competitors (M=4.020, SD= 0.750).

The respondents also agreed that there is a training culture in the organization (M=4.000, SD=0.707). In addition, the respondents agreed that the projects identify the customer's needs through constant feedback from them (M=3.918, SD= 0.731). The respondents agreed a continuous cycle of reviewing processes is present in the projects (M=3.837, SD= 0.717)

Table 2: Project Quality and Project Sustainability

	Mean	**Std. Deviation**
Customer focus		
The projects identify the customer's needs through constant feedback from them	3.918	0.731
Everyone in the organization has a strong understanding on the customers, suppliers, and competitors	4.020	0.750
Continual improvement		
All critical processes are documented and updated	4.143	0.736
A continuous cycle of reviewing processes is present in the projects	3.837	0.717
Leadership commitment		
There is incorporation of quality principles into everyday operations and strategies	4.041	0.676
There is a training culture in the organization	4.000	0.707
Aggregate	**3.993**	**0.720**

Correlation Analysis

The present study used Pearson correlation analysis to determine the strength of association between independent variables (project risk management and project quality) and the dependent variable (project sustainability in Water service Regulatory Board Nairobi County, Kenya).

Pearson correlation coefficient range between zero and one, where by the strength of association increase with increase in the value of the correlation coefficients.

Table 3: Correlation Coefficients

		Project Sustainability	Project Risk Management	Project Quality
Project Sustainability	Pearson Correlation			
	Sig. (2-tailed)			
	N	49		
Project Risk Management	Pearson Correlation	.805**	1	
	Sig. (2-tailed)	.003		
	N	49	49	
Project Quality	Pearson Correlation	.815**	.297	1
	Sig. (2-tailed)	.000	.060	
	N	49	49	49

From the results, there was a very strong relationship between project risk management and project sustainability in Water service Regulatory Board Nairobi County, Kenya (r = 0.805, p value =0.003). The relationship was significant since the p value 0.003 was less than 0.05 (significant level). The findings are in line with the findings of Filyppova *et al* (2019) who indicated that there is a very strong relationship between project risk management and project sustainability.

Moreover, there was a very strong relationship between project quality and project sustainability in Water service Regulatory Board Nairobi County, Kenya (r = 0.815, p value =0.000). The relationship was significant since the p value 0.000 was less than 0.05 (significant level). The findings are in line with the findings Rose (2022) who indicated that there is a very strong relationship between project quality and project sustainability.

Regression Analysis

Multivariate regression analysis was used to assess the relationship between independent variables (project risk management and project quality) and the dependent variable (project sustainability in Water service Regulatory Board Nairobi County, Kenya).

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.867[a]	.752	.753	.10412

The model summary was used to explain the variation in the dependent variable that could be explained by the independent variables. The r-squared for the relationship between the independent variables and the dependent variable was 0.752. This implied that 75.2% of the variation in the dependent variable (project sustainability in Water service Regulatory Board Nairobi County, Kenya) could be explained by independent variables (project risk management and project quality).

Table 5: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	102.028	2	51.014	171.764	.002[b]

Residual	13.653	46	.297
Total	115.681	48	

a. Dependent Variable: project sustainability in Water service Regulatory Board Nairobi County, Kenya

b. Predictors: (Constant), project risk management and project quality

The ANOVA was used to determine whether the model was a good fit for the data. F calculated was 171.764 while the F critical was 3.200. The p value was 0.002. Since the F-calculated was greater than the F-critical and the p value 0.002 was less than 0.05, the model was considered as a good fit for the data. Therefore, the model can be used to predict the influence of project risk management and project quality on project sustainability in Water service Regulatory Board Nairobi County, Kenya.

Table 6: Regression Coefficients

	Unstandardized Coefficients		**Standardized Coefficients**	**t**	**Sig.**
	B	Std. Error	Beta		
(Constant)	0.335	0.085		3.941	0.000
project risk management	0.345	0.089	0.344	3.876	0.002
project quality	0.361	0.093	0.362	3.882	0.001

The regression model was as follows:

$$\mathbf{Y = 0.335 + 0.345X_1 + 0.361X_2 + \varepsilon}$$

According to the results, project risk management has a significant effect on project sustainability in Water service Regulatory Board Nairobi County, Kenya β_1=0.345, p value= 0.002). The relationship was considered significant since the p value 0.002 was less than the significant level of 0.05. The findings are in line with the findings of Filyppova *et al* (2019) who indicated that there is a very strong relationship between project risk management and project sustainability.

The results also revealed that project quality has a significant effect on project sustainability in Water service Regulatory Board Nairobi County, Kenya, β1=0.361, p value= 0.001). The relationship was considered significant since the p value 0.001 was less than the significant level of 0.05. The findings are in line with the findings of Rose (2022) who indicated that there is a very strong relationship between project quality and project sustainability.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The study concludes that project risk management has a positive and significant effect on project sustainability in Water service Regulatory Board Nairobi County, Kenya. Findings revealed that risk identification, risk assessment and risk mitigation influences project sustainability in Water service Regulatory Board Nairobi County, Kenya.

In addition, the study concludes that project quality has a positive and significant effect on project sustainability in Water service Regulatory Board Nairobi County, Kenya. Findings revealed that customer focus, continual improvement and leadership commitment influences project sustainability in Water service Regulatory Board Nairobi County, Kenya.

Recommendations

The study recommends that the management of Water service Regulatory Board in Kenya should implementation of a robust risk management framework that emphasizes continuous stakeholder

engagement. By actively involving stakeholders in the risk assessment and mitigation processes, the board can ensure that potential risks are identified early and addressed collaboratively.

In addition, the study recommends that the management of Water service Regulatory Board in Kenya should adopt a comprehensive quality assurance and control system throughout the project lifecycle. This system should include rigorous standards for project design, execution, and maintenance, alongside regular quality audits and performance evaluations. By ensuring that all project components meet high-quality standards from the outset, the board can prevent costly rework, reduce operational inefficiencies, and extend the lifespan of water infrastructure.

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