

**RESOURCE MANAGEMENT PRACTICES AND SUSTAINABILITY OF WATER
PROJECTS IN TANA RIVER COUNTY, KENYA**

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**A RESEARCH PROJECT SUBMITTED TO THE SCHOOL OF BUSINESS,
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UNIVERSITY**

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DECLARATIONS

This research project is my own work and has not been previously submitted for a degree or any other kind of recognition at any academic institution. Reproduction of any component of this research project is strictly prohibited without the explicit authorization of the author and/or the institution.

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DEDICATION

This research is dedicated to my family members for their unwavering support and encouragement. May the omnipotent bestow plentiful blessings upon everybody.

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OPERATIONAL DEFINITION OF TERMS

Sustainability of Projects: The social impact, economic impact and environment impact were used as indicators of sustainability of projects.

Resource Allocations: This research focuses on the allocation and scheduling of available resources to specified project activities in a way that is both efficient and cost-effective.

Resource Monitoring: Resource management is the systematic tracking of available project resources, monitoring their usage, identifying potential resource leaks, and taking corrective actions. This is essential for ensuring the successful completion of project deliverables using the available resources.

Resource planning: Project estimation encompasses the detailed documentation or specification of the precise quantities of materials, personnel, and equipment necessary to properly accomplish different tasks and activities within the project.

Resources Scheduling: This research focuses on a strategy for effectively allocating available resources to activities and tasks within a project. It also involves scheduling the dates for these tasks or activities based on resource availability.

ABSTRACT

The economic progress of nations, especially emerging ones, depends on the long-term viability of water infrastructure projects carried out by governments. These initiatives significantly contribute to economic productivity and industrialization, as well as increasing employment possibilities and alleviating poverty, among other advantages. Only 16% of water projects in Tana River County have proven beneficial to the social and economic well-being of the community members. Out of the water projects completed in 2021, a staggering 59% remain non-operational, while over 25% experience intermittent functioning due to ineffective management of machinery and resources. The primary aim of this research was to evaluate the impact of project resource management methods on the sustainability of water projects in Tana River county, Kenya. The research was conducted with the particular aim of determining the impact of resource planning, resource scheduling, resource allocation, and resource monitoring on the long-term viability of water projects in Tana River county, Kenya. The research was based on the theories of project management, constraints theory, and resource-based perspective theory. A descriptive survey methodology was used. This research focuses on 83 project stakeholders, including 5 county officials from the County Environment, Water, Natural Resources & Climate Change department, 13 project managers, and 65 project management committee members. The study revealed that resource planning had a favorable and substantial impact on project performance. Project management teams in the county have embraced the use of resource planning software/computer packages. The study revealed that implementing resource scheduling has a favorable and substantial impact on the sustainability of water projects in Tana River County. Resource calendars are heavily utilized in water projects in the county. The availability of resources is consistently taken into account during the scheduling process for implementing county water projects. Additionally, there is effective prioritization of resources in situations where there are competing demands for resources. The study revealed that resource allocation had a little impact on the sustainability of water projects in Tana River County. Nevertheless, there was prompt provision of the necessary resources for executing water projects throughout the county, ensuring consistent and effective allocation of resources for their implementation. The study revealed that the monitoring of resources has a notable and meaningful impact on the sustainability of water projects in Tana River County. Nevertheless, there was a reasonable level of consistency in examining the physical and financial advancement of water projects in the county in relation to the predetermined resource plans. The research suggests that resource allocation should be based on job demands and efficiency requirements, with a higher number of workers during peak hours and a reduced workforce during slower periods. The research suggests using diverse strategies for work scaling and planning in asset management. The research advises project managers to be cognizant of the project's scope, since the magnitude of the project will significantly influence their allocation of funds. The many methodologies used should include fundamental and widely-used procedures, such as scientific analysis meetings like earned value analysis and critical path analysis.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

As the world's population rises, essential resources like water are under increasing strain. An vital aspect of water management is giving locals the tools they need to protect their water supplies via community-based initiatives (Eaton et al., 2021). Water infrastructure projects, among others, play an essential role in society by meeting the need for economic growth and, more significantly, by improving the living conditions of the general populace (Onyango, Bwisa, & Orwa, 2017). Chapter 27 of the United Nations' 21st agenda recognizes the key role of public infrastructure projects in sustaining development (UN Charter 1945). Equally important is the role of an enabling environment, as stated in Sustainable Development Goal 6 (SDG 6), which aims to provide everyone with access to clean water and sanitation by promoting the responsible management of water resources, wastewater, and ecosystems. Nevertheless, more than one billion people throughout the world lack access to safe drinking water. In rural areas and small towns, this problem is especially severe since getting clean water may be a huge hassle, the water sources might be polluted, or the cost of water can be prohibitive (Kagiri & Wainaina, 2017).

Budget, deliverables, and budget controls are the three pillars upon which project performance is built on a global scale. In order to help the public sector complete projects and achieve development goals, research conducted by Savoldelli, Azzone, and Arnaboldi (2019) in Italy's government found that using resource management practices in public projects was an effective way to improve management skills. Since the government is the only entity capable of massively executing public water projects, it is imperative that these projects have sufficient funding to be carried out to their maximum potential (Yeri, 2018). The social and

economic advantages that China would have gained from well-planned water infrastructure projects have been significantly reduced as a result of subpar performance, marked by issues such as delays, poor quality, and cost overruns, among other key performance indicators (Hansen, Li & Svarverud, 2018).

Between 2014 and 2020, China launched two enormous water projects: the South-to-North Water Diversion Project and China's giant water projects. Chinese authorities have launched the world's biggest water diversion project, the South-to-North Water Diversion Project. As part of the project, water will be extracted from rivers in the south and sent to the arid north. It has taken fifty years for this enormous project to get from idea to start, and it will likely take almost as long to build (Hansen, Li, & Svarverud, 2018). The management of resources was a role in the length and quality of China's South-to-North Water Diversion Project (Geall & Ely, 2018). Pan (2019) contended that although China's water policy and regulation are undeniably getting smarter, the rapid acceleration of water infrastructure construction in the country is mostly attributable to better planning, scheduling, allocating, and monitoring of resources, with only a small amount of credit going to ecological improvement.

Both the Malaysian government and private concession corporations are involved in the management and operation of water projects in the country since the privatization process in 1987. According to Kun, Talib, and Redzwan (2018), some governments have gone to the extremes of privatizing and corporatizing their water projects, while others have restricted privatization to certain sectors, such the management and maintenance of water treatment facilities via concession agreements. Bin, Marhani, Yaman, Noor, and Rashid (2019) further noted that in a particular state where resource management methods are crucial, many private corporations may be responsible for running and maintaining the water projects. The water projects in Malaysia are overseen by a variety of agencies and enterprises, making it difficult

to compare and assess their performance as well as the quality of services provided to customers.

There have been many water project delays in Africa, for example in Ghana (Agyeman, 2019). This circumstance worsens the already bad living conditions of the general people in Ghana, which limits the social and economic progress of the rural economy (Sabastian and Nathan, 2017). However, current methods of resource management that focus on adding new services are jeopardizing their long-term viability by pushing for the hasty construction of infrastructure at the expense of the necessary investment in operation and maintenance. From ancient times forward, the completion of projects has been the primary focus of almost every African administration. Project delays, incompleteness, poor craftsmanship, and cost overruns impact the overall performance of projects in South Africa. This is due to problems with resource planning, adequate allocation, and monitoring in many government ministries. Projects are said to be unable to stay on track in terms of time, money, and scope if delays and cost overruns occur (Oluwoye & Crawford, 2019).

Unlike the federal government, which has the expertise and experience to deal with the unique problems faced by each county, devolution has put counties in a better position to provide social services to their constituents (Kajwang, 2019). Due to the unique nature of the problems, county governments have been able to reserve the necessary finances to implement a variety of infrastructure projects, including water treatment facilities (Murugu, 2019). While county governments in Kenya are responsible for implementing some of their own development plans, the federal government—which accounts for at least 35% of Kenya's budget—provides the bulk of the funding (Adek, 2020).

According to Jacob and Gichuki (2020), community water delivery initiatives in Kenya have been praised by several communities for their efficacy and feasibility. One potential threat to a project's long-term viability is the possibility that the sustainability assumptions initially considered during planning and design could change over time. A reliable water supply, stable water rules, and the capacity for continuous local administration are the pillars upon which most community-managed water projects rest. On the other hand, Kariuki (2021) pointed out that a decrease in water supply might be the consequence of either overuse of water or climate change, the latter of which has the potential to alter source recharge rates. This means that community-managed water projects in Kenya need extensive community involvement all the way through the project's lifespan and continuous external funding even after it has concluded.

Both the federal and state governments' water projects have grown in scope and magnitude, and a corresponding rise in funding has been seen (Musyoki, 2018). Projects involving water need a number of interdependent and correlated operations (Nagaraju & Reddy, 2019). In this day and age, when everything is happening so quickly, there are a lot of restrictions put on things from a logistical, legal, ethical, and financial standpoint. As a result, there are inherent risks, obstacles, and uncertainties in such initiatives, and they need substantial resources (Kariuki, 2021). As a consequence, there has been a domino effect of problems related to resources, including how many are needed, where they come from, when to transport them, how to put them to good use, and when to demobilize them (Kohli, 2020). According to Kerzner and Kerzner (2017), resources are a major factor that affects the design and execution of water projects.

County water building projects sometimes need a lot of area, time, people, materials, and machinery since they are of good quality (Kumari & Vikranth, 2019). The counties in

question are in dire need of a more sophisticated and adaptable model for resource management due to the massive financial and technological expenditures required to complete their major water works (Pojani & Stead, 2018). When it comes to significant water projects, Tana River County has been right in the thick of things. On the other hand, according to the Tana River County government (2022), many water projects in the county have been unsuccessful in meeting the three main criteria for project success: time, quality, and cost and time. The efficient and fair distribution of limited resources, as well as a rise in their utilization ratios, are guaranteed by the use of cutting-edge resource management techniques (Blichfeldt & Eskerod, 2018). Most public infrastructure projects, say Pinha and Ahluwalia (2019), end up costing more than expected and running behind schedule because of incompetent resource management. This research seeks to address that question by investigating how water project sustainability in Tana River County, Kenya is impacted by resource management techniques.

1.1.1 Sustainability of Water Projects

The supply of constant advantages to project owners and beneficiaries, as stated by Abrams (2018), is what makes a project sustainable and guarantees its continuation. We aim to improve the product's quality while keeping the project on track to offer the same degree of functionality as originally planned, according to the project plans. According to research by Nakagami, Kubota, and Setiawan (2016), there are a number of critical success elements for a project's sustainability. Affordability of maintenance and repair costs and access to qualified service providers are two of these elements that contribute to the success of water infrastructure projects. Involving the project's beneficiaries in its execution, says Kwena (2015), makes them feel more invested in the initiative and increases the likelihood that it will be completed successfully. All relevant stakeholders must be included by project

planners and implementation teams until the project is entirely finished and commissioned for there to be thorough stakeholder engagement across all phases (Kwena, 2015).

A lot of countries have been struggling with the question of how to ensure that water infrastructure projects run under devolved units would be sustainable (Zakayo, 2017), and different countries have seen different outcomes. According to Calamai (2019), in Italy, there have been numerous financial resource constraints and disparities in the distribution of funds for water infrastructure projects among the various devolved governments. Since then, 15% of the areas have had problems with their water infrastructure, while the rest have had enough. However, via the use of better fiscal decentralization processes, devolution in the Czech Republic has increased access to physical water infrastructure projects by enabling devolved units to timely fund them (Hemmings, 2019).

In the early 1980s, India went from being a least developed nation (LDC) to a medium developed country because to the devolution of large water infrastructure projects. According to Alsuwaidi (2019), who examines the situation of development in Asian nations, decentralization of development projects in India was a key factor in the country's water development. A number of factors, including a lack of funding, cause sustainable water development projects in India to progress at varying rates in different devolved units, according to Alsuwaidi.

There was a social, economic, and environmental effect concern with the sustainability of water projects in Nigeria's autonomous areas. Omoregie and Radford (2016) found that once water infrastructure was devolved, project expenses soared, leading to high finishing costs relative to the original estimates. Seven out of ten initiatives in Nigeria had delays in execution, according to the authors. Despite the fact that water projects in Tanzania have

been better identified, funded, and sustained as a result of devolved unit reforms (Tsekpo & Hudson, 2018), major county governments have remained in their development comfort zones, resulting in regional project development imbalances related to resource management.

International Monetary Fund (IMF) and Dutch government-funded water projects in Nandi, Kisii, Murang'a, and Kwale counties in Kenya have failed to address social, economic, and environmental concerns (World Bank 2019). Only 21% of these development projects were successfully completed between 2013 and 2020, according to the World Bank research. When it came to maintaining these dilapidated projects, 48.25% of these counties fell short. Several lingering concerns, including as inadequate funding and careless use of limited resources, contributed to the 55% failure rate of project execution across counties, according to a 2020 report by the devolution ministry. This confirms the results of a 2020 government assessment in Kenya that indicated 49.21% of county development water projects were not finished due to unnecessary and preventable issues. In order for projects to last, strong community governance and members' willingness to work together are crucial.

Adadzi, Coffie, and Afetorgbor (2019) state that the project's beneficiaries are capable of ensuring the community's safety and security and putting conservation measures into action. Making sure the project is protected ensures that its benefits may be enjoyed for the foreseeable future. To guarantee the longevity of water projects, Egan and Agyemang (2019) propose using modern technologies, encouraging public accountability, and encouraging engagement in the management and monitoring procedures. In order for water projects to be sustainable, local residents need to be trained to fix little problems, employ modern technology, and adopt a participatory management style (Kisang, 2019). A number of obstacles to environmentally sustainable building practices were pointed up by Opoku, Ayarkwa, and Agyekum (2019). Some of these obstacles include local populations' lack of

interest and involvement, technical difficulties, insufficient information and understanding of sustainable methods, and the perceived early expenses of the project. Improving sustainability requires attention to the following points.

According to Lillian and Mutiso (2019), a major obstacle to the long-term viability of water projects is the fact that many Kenyans have limited access to and availability of water. There has been no continuous project execution despite the best efforts of investors, the donor community, and the government. Mwangangi (2016) states that a demand-response approach is better at guaranteeing projects' sustainability in the long run, and suggests using it. Local stakeholders are discouraged from becoming involved since the supply-driven model limits their engagement and participation. Because of the increased risk of project failure due to sustainability concerns, this approach is considered negative. In order to make people feel more invested in water projects, Kinyua, Mwangi, and Riro (2015) say that water consumers should form groups. Instilling a sense of personal investment in projects may boost their chances of success in the long run. Njogu (2018) states that community engagement and active participation lead to better performance and long-term sustainability of water projects. This means that these projects will continue to serve local communities for years to come.

The capability and sustainability of water projects are greatly affected by technical factors and the availability of financial resources, according to the research by Hassan, Osore, and Ong'ayo (2020). For water projects to be considered sustainable, they must be able to reliably provide people with potable water for an extended period of time thanks to regular maintenance and operation. This study seeks to evaluate the long-term viability of water projects by looking at a number of important factors, including as the reliability of the water supply, the ease of use of the system, the presence of contaminants in the water at all times, and the frequency of repairs and improvements.

1.1.2 Resource Management-Practices

Effective and efficient deployment of an organization's resources at the precise moment they are needed is what is known as resource management (Watt, 2017). Developing the best way to allocating resources to activities or tasks inside a project is the foundation of resource management, which is a subset of project management (Maserang, 2012). The acquisition and use of internal and external resources that are necessary for a project's completion are both included in resource management. The primary goals of this approach are to establish priorities for resource use, track resource production and consumption, and evaluate resource efficacy (Engwall& Jerbrant, 2003; Petrovic& Van Bruwaene, 2004).

Frame (2003) states that one part of project planning is resource management, and that this part converges on the supplies used to make the project's deliverables. Costs associated with materials, labor, and equipment used in a project are often a part of resource management (Kerzner & Kerzner, 2017). The planning phase of a project is incomplete without resource management, which ensures that the project's execution adheres to the scope and overview determined during planning (Westland, 2007). This is because resource management encompasses the time and money needed to complete individual tasks.

To improve efficiency and provide an overview of available and capacity resources, resource planning involves assigning and using resources such as people, machinery, and equipment (Monk & Wagner, 2012). In order to ensure that your project meets its output requirements without experiencing delays or disputes, it is important to organize your resources wisely (Umble, Haft, and Umble, 2015). This includes allocating tasks to team members at the appropriate times. Better project performance, more accurate expenditure forecasts, and less budgeting are all outcomes of a well-thought-out resource strategy.

Organizations utilize resource scheduling, a collection of procedures and methods, to make the most effective use of their available resources by allocating them to specific jobs, activities, or projects and then setting start and finish dates for those things according to when those resources will be available (Gordon & Tulip, 2017). According to Chan, Chua, and Kannan (2018), scheduling resources gives you a better idea of how long things will take as it gives you another way to evaluate your project timeline. Superior organization of all project-related resources (including teams, locations, equipment, and more) is achieved via resource scheduling. Everything is in place for your project duties to be resourcefully divided up.

The most efficient and cost-effective use of available resources is the goal of resource allocation, as pointed out by Schwindt (2016). Despite the scarcity of resources, projects will always need some. Therefore, it is up to the project manager to figure out when such resources should be allocated within the project timeline. According to Engwall and Jerbrant (2018), one of the most crucial aspects of project management is resource allocation. This is because, as the authors explain, it helps to visualize the total amount of work that needs to be done, which in turn facilitates planning and preparation for the project's implementation or goal achievement. Moreover, it enables the analysis of potential risks and threats, which ultimately leads to improved project performance.

To keep a project on track in terms of scope, budget, and deadlines, resource monitoring involves tracking all metrics related to the project, such as team performance and task duration. When problems are identified, corrective actions can be taken (Elonen & Artto, 2019). According to Lyons, Runge, Laskowski and Kendall (2019), resource monitoring is crucial for figuring out how much abstraction can be done sustainably, if innovations are feasible, and how to manage the resource efficiently as a whole. Consequently, resource

monitoring aids project managers in keeping tabs on, analyzing, and reporting pertinent data and information throughout a project's life cycle.

1.1.3 Water Projects in Tana River County

The coastal area of Kenya is home to Tana River County. Kitui County forms its western boundary with Garissa County; Isiolo County forms its northern border with Lamu County; Kilifi County forms its southern border with the Indian Ocean; and Lamu County forms its southern and eastern borders with Kitui County. With an area of 38,862.20 Km², the county is located between longitudes 380° and 40015' East and latitudes 000'53" and 200'41" South. A 76-kilometer stretch of coastline borders the county. This industry is vital to the economy of Tana River County because it protects, maintains, and enhances the county's natural capital and environment. It helped bring GDP up by about 3.2% in 2019 and will be crucial in reaching the 10% yearly GDP growth objective set forth in Vision 2030.

In accordance with the National Water Service strategy, the County Water Act, MTP II, and the National Environment policy, the environmental protection, water, and natural resources sectoral plan of Tana River County aims to ensure the sustainable use of limited resources, water, and the creation of synergy among stakeholders in the sector for the greater benefit of the local people. To promote socio-economic development geared towards the realization of Kenya's Vision 2030 and Sustainable Development Goals (SDGs), the plan also envisions greater efficiency in the use of resources. Investing in this sector guarantees optimal, effective, and seamless linkages with all other sectors of the economy. In addition to improving manufacturing, ensuring food and nutrition security, providing universal health coverage, and affordable housing, the sector also supplies commodities and services that are important enablers for achieving the Big 4' Agenda. Indirectly, it boosts the sector's people and financial resources, which in turn produces jobs.

There is a significant rate of postponement, cost overruns, and abandoned works in county water infrastructure projects (Akali, 2018). The overall water infrastructure in Tana River County has been impacted by the region's long history of geographical and historical marginalization, which has continued to this day (World Bank, 2019). The water subsector in Tana River has been steadily expanding over the years. In particular, the County Government has used the department to dig thirty boreholes, build eighty water pans in various hinterland locations, and restore one hundred. Additional pipeline expansions to previously unserved regions have also surged. The agency has also hired a ground water technician, an electromechanical officer, a water quality officer, and water engineers, among others, to enhance its manpower. Unfortunately, water initiatives in Tana River County have not been successful in terms of sustainability. After losing funding and support from development partners and other sponsors, some water projects reportedly ceased operations (County Governance Watch, 2022). Among these projects are the following: the water supply to the cluster villages of Kalalani and Waldena; the rehabilitation of the water supply to Hola; the construction of a 25-kilometer extension to the Tana high-Hororesa water pipeline; and the supply of water to the communities of Madogo, Garsen, and Kipini. The study details a number of issues, including technical difficulties with the generators, vandalism of pipelines, theft or damaged devices that were not fixed in a timely manner, and a lack of project management skills among community members. Community WASH programs and urban sanitation initiatives have been consistently sponsored by TAWASCO, according to WSTF (2022), as have numerous governments and NGOs. Problems in maintaining the water projects, however, have continued to impede Tana River County's economic and social progress.

1.2 Statement of the Problem

According to Calderon, Cantu, and Chuhan-Pole (2018), governments' water infrastructure projects are crucial to the economic growth of nations, especially emerging ones. Economic productivity and industrialization, greater employment possibilities, and poverty reduction are just a few of the many advantages that these initiatives provide. World Bank (2021) notes that project failures and unsustainability have diminished the advantages of these initiatives. World Bank data from 2022 shows that just 16% of Tana River County's water projects are still helping locals out economically and socially, 59% of 2021's water projects are still not operational, and 25% are experiencing on-and-off operations because of poor machine and resource management. For example, the 25Km Tana high-Hororesa water pipeline extension was poorly maintained, which led to the closure of the project and the water supply to cluster villages; Kalalani and Waldena are manually operated and have not improved the social, environmental, or economic lives of the people in Tana River County. The projects of Garsen Water Supplies and Kipini Water Supplies were also closed three months after they were completed. The water supply pipeline from Minjila to Dalu was vandalized and mismanaged a year after its completion.

The water projects in Kipini, Minjila to Dalu, Tana high-Hororesa, Kalalani, and Waldena have resulted in unsustainable practices, health and environmental emergencies, and poor or negative returns on investment (WSTF, 2022). Unfortunately, these initiatives failed to achieve their goal of improving farmers' capabilities. All of these things made it harder to develop long-term irrigation plans for crop production and to extend those plans to other regions in order to boost food security and people's standard of living. The key to long-term success for water projects, according to the WSTF's (2022) analysis of projects in Kenya's counties, is effective management of available resources. According to the research, nearby counties like Garissa and Kitui have recognized the importance of water resource

management and have significantly reduced the rate of failed water projects. Tana River County is one of these counties. The impact of resource management methods on the sustainability of water projects is an area where scientific study is lacking, according to empirical studies.

Research by Ochieng (2019) looked at how GSM firms in Kenya deal with resource management and how it affects project success. The research revealed that GSM companies in Kenya understand the necessity of resource management. Nevertheless, the inferential analysis is not presented in the research that used qualitative data. All of the project resource planning approaches that were considered had a positive and substantial influence on project performance, according to a research by Umulisa, Mbabazize, and Shukla (2021) that looked at the Agaseke Project in Kigali, Rwanda. The scene was set in Kigali, on the Agaseke project. Research by Ndayisaba and Mulyungi (2018) on the impact of resource management on project performance in Rwanda's rural Muhanga area found that it had an effect on the project's ability to boost livelihoods. The study may not have been typical of the whole population due to its limited sample size and cross-sectional research approach. So, this research looked at how water projects in Tana River County, Kenya, fared in terms of sustainability after using various project resource management strategies.

1.3 General Objective of the Study

The general objective of this research was to determine how various project resource management strategies impacted the sustainability of water infrastructure projects in the county of Tana in Kenya.

1.3.1 Specific Objectives of the Study

The investigation was directed by the following precise goals;

- i. To determine how resource planning affects the sustainability and performance of water projects in Tana River County, Kenya.
- ii. To ascertain how resource scheduling affects the sustainability of water project performance in Tana River County, Kenya.
- iii. To investigate how resource allocation affects the long-term viability of water projects in Kenya's Tana River County.
- iv. To investigate how resource monitoring affects Tana River County, Kenya, water projects' sustainability.

1.4 Research Questions

These research questions were the focus of the investigation;

- i) What effect does resource planning have on Tana River County, Kenya, water projects' sustainability?
- ii) What effect does resource scheduling have on the sustainability of water projects in Kenya's Tana River County?
- iii) What effect does resource allocation have on the sustainability of water projects in Kenya's Tana River County?
- iv) What impact does resource monitoring have on Tana River County, Kenya's water projects' sustainability?

1.5 Significance of the Study

Both Tana River County and other counties may benefit from the study's findings if they were to be implemented. These results would educate these authorities on what they need to do to develop ways to improve the management of county project resources and close any gaps they uncover. Project resource plans, schedules, frameworks, and processes that are

defined and created are essential for improved project performance, and this research will play a key role in highlighting the importance of these things. The results of the research will be used by the county government to start comparing their project resource management practices to those of other counties or companies that have achieved tremendous success with advanced methods of project resource management.

The results would be significant because they would show how the county's water projects have fared due to delays in allocating project resources and how efforts are being made to diversify project resources, particularly in light of the fact that national government disbursements are often late. Project mobilization strategies that are up to scratch might be aided by this. In order to find out where the county's resources are being wasted or underutilized and how to maximize project outcomes, the results will also be used to evaluate the optimization of the county's project resources.

The study's findings will also be useful for national government policymakers, like those in the Ministry of Devolution, who are working on documents and guidelines to help counties use project funds more wisely and close any gaps that could allow for misappropriation. Additionally, by offering a Kenyan viewpoint on the subject, this research would play a crucial role in filling a gap in the literature on project resource management. If other researchers are interested in advancing research in a similar subject or doing further research in this area, they might use the study's results as a reference.

1.6 Scope of the Study

Assessing the impact of resource management methods on the long-term viability of water projects in Tana River County was the only focus of this study. Time and other limitations prevented this research from covering every possible practice of project resource

management, despite the fact that there are many. In light of the fact that these restraints pertained to water project sustainability in Tana River County, they included not only the planning and scheduling of resources, but also their allocation and monitoring. Due to the large size of the county, only thirteen water projects that had been deemed unsuccessful by the Tana River County Government were considered for the research. The research has its limitations in 2023 as well.

1.7 Limitations of Study

Several challenges may arise for the researcher when they carry out this investigation. There were instances of respondents being unwilling to disclose specific information that was crucial to the study, due to the sensitive nature of the topic (project resources and their management, particularly in light of the growing number of questions about the use of government resources). Fear of victimization was a major factor in this, as people were hesitant to provide critical information for fear it might be exploited against them. The researcher overcame this obstacle by maintaining a strict protocol of participant anonymity by excluding any identifying information from the survey. Respondents were reassured that their information will be treated with the utmost confidentiality and used only for academic research. The research was also sent to the county government's upper echelons. Some responders' availability, especially upper-level managers who may have outside-of-office obligations or hectic schedules, is an issue. The researcher, with the help of his assistant, notified respondents in advance and scheduled appointments to administer the surveys at times that were convenient for them in order to increase the study's response rate.

1.8: Organization of Study

There are five sections to this project. In the first chapter, you can find the study's rationale, problem description, goals, importance, scope, constraints, and organizational details. In the second chapter, you will find a review of the literature on several topics, including theory and

practice, as well as a summary of the reviews, research gaps, and a conceptual framework. Research design, population of interest, sampling strategy, research tool, data gathering process, data analysis, and ethical issues are all covered in Chapter 3's methodology. The study's results and discussion are laid forth in Chapter 4, which includes the following sections: background information, response rate, descriptive statistics, inferential statistics, and qualitative data analysis. Summarization, conclusion, policy/practice suggestions, and recommendations for more research are all included in chapter five.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The purpose of this review is to scour the literature on the topic of global best practices for managing resources in relation to project success. Theories that contribute to and expand upon the study's theoretical underpinnings are first covered in this section. The next step is to carry out the matter-related empirical investigations in accordance with the study goals. Subsequent to that, the chapter presents the conceptual framework, illuminating the connection that exists between the study's variables.

2.2 Theoretical Framework

In this part, we covered the theories that constituted the foundation of the investigation. Project management theory, the theory of constraints, and the resource-based approach are all part of this set of ideas. The study emphasized the key points of the theories and explained how they related to the research.

2.2.1 Theory of Constraints

According to this idea put out by Goldratt (1984), there are limitations that prevent a system from accomplishing its goals. Various business processes that might affect performance include production, planning, control of production, project management, logistics, accounting, and performance assessment. Whether or not restrictions are acknowledged, this theory states that they define the output of a system. Finding suitable solutions to lessen the limits of an organization's system is the goal of top management. In this manner, the company may achieve its objectives and earn the most profit possible.

According to Goldratt (2006), this theory not only explains why the system is constrained, but it also provides guidance on how to overcome these limitations. Organizations rely on

systems to function. A system is a set of interconnected processes that, when given an input and told to operate together, produce an output in order to achieve some objective. An obstruction that stops the system from trying to accomplish the organization's objectives is what we call a restriction (Noreen, Smith, & Mackey, 2008). Project teams in counties confront restrictions while planning, scheduling, allocating, and monitoring project resources when constructing road infrastructure, so the theory of constraints is relevant to this research. The most effective strategy for dealing with this kind of issue is to identify and eliminate obstacles to sustainable water projects (Ruhl, 2011). If water projects are to be successful, resource management is a crucial component that must be carried out efficiently. Inadequate resources that are not properly distributed across project tasks are one of the obstacles that hamper project success. Project inefficiencies, delays, and possible cost overruns are all outcomes of these constraints, which make it very unlikely that projects will be successfully completed. On the other hand, Noreen et al. (2012), who are in favor of this theory, stress the need of project teams recognizing constraints and developing effective solutions to cope with them early on in order to lessen their influence on road projects.

This theory serves as a framework for both the broad and detailed aims of this research. First, dealing with the dependent variable—the sustainability of water projects—is where this theory really shines. Reducing obstacles that may otherwise degrade project results, such as the quality of water projects created, is crucial for the successful completion of water projects done by the Tana River County administration. The management of the project's resources, including their planning, scheduling, allocation, and monitoring, might be the cause of these limitations. This idea emphasizes the need of project management in identifying potential performance-limiting limitations and then taking action to resolve them. Accordingly, this theory served as a framework for evaluating resource management concerns that may impact the long-term viability of water projects in Tana River County.

2.2.2 Resource Based-View Theory

An business has a great opportunity to gain an edge over its competitors if it has strategic resources, according to this thesis put out by Barney (1991). With this advantage over rivals in the same industry, the company may earn unbeatable profits. Project managers are responsible for making the most of the resources at their disposal throughout the entire project lifecycle. This includes tasks such as cataloguing and organizing the firm's resources, gauging their strengths and weaknesses in comparison to competitors, finding ways to improve resource utilization, determining the firm's capabilities, evaluating the resources' capacity to generate rent and sustainably use them, choosing the best resource exploitation strategy relative to competitors, and identifying any gaps in resources that need to be filled (Johnstone & Bren).

Using the available resources as a starting point, this theory investigates the need for optimal project design and execution. This is the foundation upon which management builds, making full use of the available resources to ensure the projects are completed to the best of their abilities. Therefore, this theory is essential since it underlines the need of proper project planning, scheduling, resource allocation, and monitoring in order to guarantee that projects last.

2.2.3 Resource Dependency Theory

Foundational to this investigation was Pfeffer and Salancik's resource dependency hypothesis (1978). Both internal and external contingencies are characterized as potential threats to initiatives in the theory. These unforeseen events happen because projects rely on external

resources that are vital to the project organization's survival and success. These resources are subject to some degree of control by external circumstances, which might impact the actions of project team members and lead to reliance on those elements.

Project organizations strive to either lessen their own reliance on others or make others more dependent on them in order to gain control over resources and guarantee the effective completion of projects (Ulrich & Barney, 2014). Project organizations should prioritize resources that are essential to their long-term viability, according to resource dependency theory. This theory offers both theoretical and empirical support for this recommendation. To guarantee a successful conclusion, Pfeffer and Salancik (1978) devote a large amount of their work to discussing how a project organization might manage resource dependency on its surroundings.

A company's capacity to acquire, process, and consume raw resources at a quicker rate than rivals is crucial to its success, which is why the theory is significant. It is important to carefully plan tactics to ensure that resources are accessible, as they are typically controlled by organizations that are not directly related to the organization that needs them.

2.3 Empirical Literature Review

In this part, we take a look at the research that has been done empirically, focusing on how resource management techniques affect the long-term viability of projects all over the world. The section is organized in accordance with the study's goals.

2.3.1 Resource Planning and Project Sustainability

According to Abu El-alkass's (2021) research on the Gaza strip's construction contractors' resource management system, equipment planning is essential for keeping costs down on construction projects. This is because contractors must determine the various types and sizes of equipment that are available for purchase or rental. To ensure the project's success,

contractors relied on labor planning to have the proper number of workers on hand at all times and ensure that they could complete all of the necessary jobs. The research emphasized that labor constituted around 40% of total project costs, making labor productivity optimization a need. Nevertheless, as this research was conducted in a distinct environment, the results cannot be applied universally to the water projects in Tana River County.

Research on resource planning for Indian highway building projects was carried out by Kumari and Vikranth (2021). We ran the numbers. Inadequate planning and irrational decisions made by site managers contributed to these projects' underused resources, according to the report. The analysis discovered that the majority of these initiatives just planned for time resources, without taking into account the capability and availability of those resources or how they would be deployed and used. Research shows that material planning cuts down on waste and makes sure everything needed for a project is on hand. The results also showed that manpower planning was critical to the success of the projects because it made sure that the correct amount of people with the right skills were available to work on the projects at the right time and in the right location. But the water projects in Tana River County will be the focus of this research.

In their 2020 study, Umulisa, Mbabazize, and Shukla examined the impact of project resource planning on successful projects, specifically looking at the Agaseke Project in Kigali, Rwanda. The study used a descriptive research approach. Project success was favorably and significantly impacted by human resource planning, financial resource planning, and time and material resource planning. Practices such as planning for procurement, training project members, general teamwork, budgeting, forecasting, and placing orders all had meaningful impacts on the projects' final outcomes. Findings from this study indicate that project resource planning improves on three fronts: keeping projects on

track financially, monitoring the efficiency of project resources, and meeting project personnel's material needs in a timely manner. Having said that, the research did use basic random sampling. Sampling methods will include both stratified and basic random sampling.

With an eye on planning, scheduling, and resource maximization, Sushma, Bhavya, Rajeeva, and Narayan (2019) investigated the use of Primavera in road building in India. It became clear that construction project resource planning was critical for reducing and managing delays. Lack of proper project resource planning results in yearly losses of time, money, and other valuables in the construction business, according to the report. Project planning software is crucial for large and complicated building projects, according to the research. It allows for accurate planning and the efficient flow of resources, which naturally leads to the intended results. Generalization of results is not possible since the research was conducted in a different place with distinct situational concerns than Tana River County.

With a focus on contractors in Nairobi County, Shadrack (2018) investigated problems with resource planning procedures in Kenya's construction industry. The study used a descriptive research approach. The majority of the industry's resource planning was found to be unstructured, despite its extensive usage. Delays in supplies and shortages in equipment and people when needed most were identified as factors negatively impacting the development of building projects within the county. The research showed that prior contracting businesses with top-down support used resource planning strategies such as equipment planning, labor planning, and material planning. While there are many contextual elements that affect the sustainability of water projects, this research primarily looked at private development projects.

2.3.2 Resource Scheduling and Project Sustainability

An evaluation of resource scheduling in multi-software projects was carried out by Dong, Li, Zhao, Li, and Yan (2021). This research made use of a comparative study approach. According to the results, resource scheduling is critical for improving resource utilization efficiency and creating successful project schedules. Inefficient use of project resources and increased expenses would ensue from not doing resource scheduling, it was stressed. Research shows that resource scheduling, by including schedules for things like the start and end dates of tasks and the resources needed to complete them, gives a clearer picture of how the project should be executed. But this study's environment is different from the one that's being studied. Additionally, in contrast to the descriptive design that was relied upon, this research used a comparative form of investigation.

In their 2021 study, Memon and Zin examined the extent to which resource-driven scheduling was used in Malaysia's construction industry. We conducted a survey. The description of resource scheduling made it clear that it was responsible for arranging project tasks so that the specified restrictions on available resources would allow the project to finish by its due date. Companies are increasingly using commercial software like Primavera Project Planner and Microsoft Project to handle resource scheduling, according to the report. On a general level, resource scheduling methods included things like resource calendars, allocating resources to tasks, setting priorities, leveling, smoothing, stretching, and separating resources. According to the research, project difficulties arose when workers failed to account for how labor, equipment, and material limitations would influence the scheduling of activities, despite the fact that the duration of each activity was dependent on the availability of resources. Unfortunately, the findings may not be trusted since they were based on a survey design.

Using a case study approach, Joshi and Patil (2021) evaluated resource scheduling in building projects. Because it enabled creative planning of project activities constrained by available resources, project resource scheduling was recognized as an extremely crucial activity for a project's successful completion. According to the research, resource scheduling reduced the likelihood of unanticipated project losses caused by wide variations in resource consumption. There was concern that timetables that failed to account for available resources may compromise project management. The research confirmed that industry-wide, large-scale projects rely heavily on tools like Primavera Project Planner and Microsoft Project for precise resource scheduling. The exploratory research approach and limited sample size of this study, however, make generalization difficult.

Lamka and Masu (2018) investigated the role of resource scheduling on the success of construction enterprises in Nairobi County. It was a mixed-methods study. It was emphasized that project teams allocated utilities to the wrong areas at the wrong times due to mistakes in resource scheduling. To achieve the primary quality, time, and cost goals within a limited budget and with insufficient resources, project managers discovered that resource scheduling made it simpler to restructure project activities and resources. Nevertheless, it is not possible to automatically generalize the results of this research as they are based on private development initiatives that take place in contexts distinct from those of Tana River County.

2.3.3 Resource Allocation and Project Sustainability

In their 2020 study, Engwall and Jerbrant examined the resource allocation syndrome as it pertains to overseeing several projects. A foundation of qualitative case studies supported the research. Key challenges in multi-project systems are interdependencies across projects and a shortage of resources. Projects had to be prioritized and resources had to be reallocated due to competition. It was determined that several projects had delays due to short-term problem-

solving. Many fell behind schedule and the majority failed to reach project objectives because resources were not adequately allocated. However, as the present study will depend on a descriptive research design, there will be a methodological gap due to the utilization of qualitative case studies.

The impact of resource allocation on the success of Kenya Urban Roads Authority projects was investigated by Bulle and Makori (2019). Descriptive research methods were used in the investigation. The research found that projects' performance was impacted by the allocation of financial, physical, and human resources. Assuring adherence to cost parameters as specified in project plans, resource allocation impacted both the rate and quality of project delivery. In order to improve and maintain project performance, the research focused on whether or not resource allocations were enough. Projects are certain to be efficient and effective when resources are used effectively, leading to better project outputs. Nonetheless, the study's historical framework examines water initiatives carried out by Tana River County.

Anunda (2019) examined the factors influencing the effectiveness of HIV/AIDS programs run by non-governmental organizations (NGOs) in Nairobi County. The research strategy used was a descriptive one. The success of these activities depended on allocating sufficient cash and attracting a significant number of contributors and partners. Most non-governmental organizations (NGOs) carrying out the programs included in this research did not have sufficient funding, as stated in the report. For project plans to be implemented effectively, it was crucial to allocate enough financial and non-financial resources. It was discovered that several initiatives were unable to finish due to insufficient funding. Nevertheless, this research's environment differs and centers on distinct initiatives compared to the ones that were addressed in the proposed study.

Using the Dairy Community Processing Center Project in Burera District as a case study, Gashuga, Kule, and Ndabaga (2019) assessed the impact of financial management on project performance in Rwanda. This research used a descriptive-correlational approach. The results showed that allocating money increased project performance by improving project delivery. Researchers found that by allocating money in a certain way, they were able to cut administrative expenses, improve efficiency prediction, and lower overall project risk. The correct use of resources was further improved by the distribution of project funding. Nevertheless, this research will utilize a different approach and contextual setting from the one used in the previous one.

Public building projects in Kenya's Trans-Nzoia county were studied by Murithi, Makokha, and Otieno (2018) to determine what variables influence the completion of these projects on schedule. The study was conducted using a descriptive survey approach. Timely completion of public construction projects was shown to be highly impacted by how resources were allocated within the project. Sufficient resource allocation impacted project success. Project delays were actually caused by problems with funding and paying for finished work. Delays in obtaining building supplies were caused by insufficient funding. In contrast to the present project, which considers not only the time performance but also the social, economic, and environmental impacts of project delivery, the context of this project focuses just on time performance.

Mogaka (2017) investigated the connection between donor-funded health initiatives in Nairobi County and the processes involved in disbursing those money. We used a descriptive survey approach. It became clear that the distribution of resources had a beneficial and substantial effect on the completion of these initiatives. The research concluded that resource allocation was useful for allocating resources to different activities at different points in the

project's lifetime. The research emphasized the critical need of allocating project resources adequately for project implementation. Appropriate training of project staff and timely distribution of project resources were highlighted in the research. The research found that when projects begin, there is sometimes a risk of resource over-allocation or even rivalry for resources among various jobs and projects. This research, however, does not include the same projects as the planned study.

Njiru (2018) examined manufacturing enterprises in Nairobi County to determine the relationship between project management methods and project implementation. The research strategy used in the study was a descriptive one. Allocation of resources and project execution were positively correlated. Project managers were able to quickly and accurately evaluate resource availability and timetables after allocating resources, which allowed them to efficiently and effectively marshal project teams. Contrary to Tana River County's public water projects, the study's emphasis was on private initiatives by industrial businesses.

2.3.4 Resource Monitoring and Project Sustainability

International non-governmental organizations (NGOs) in Kenya have their operations monitored financially, and Mosago (2020) looked at how that affects program success. The study used a mixed methods approach. For international non-governmental organizations (INGOs), keeping tabs on finances improved program outcomes. Site inspections, financial desk checks, and frequent financial review meetings might substantially enhance program performance for INGOs, according to the research. Regular financial monitoring was required. Programs were more cost-efficient, socially beneficial, and successful as a result of rigorous monitoring, reorientation, and intensification of monitoring. The likelihood of money being misallocated was lowered by financial monitoring, since they were used for the program's main business.

In his 2019 study, Ochieng looked at how much of an impact resource management has on the completion of projects carried out by Kenyan mobile communications companies. The descriptive survey design was the basis of the study. According to the findings, sufficient measures were taken to keep an eye on the project's assets, which paid off when the money went where it was supposed to. Findings from the research indicated that performance monitoring and the frequency of financial audits and reporting were both useful in cutting down on waste. It was determined that financial auditing was crucial for evaluating the method and system utilized to record and report project expenses. We cannot immediately extrapolate the research's conclusions to match the scenario under investigation since the study focused on private projects performed by mobile communications businesses, which are distinct from public water projects undertaken by Tana River County.

According to Kamwana and Muturi (2018), financial monitoring has an effect on the success rate of World Bank-financed projects, namely KPLC projects. This study used a descriptive research approach. It was determined that the success of these programs was being greatly affected by the careful monitoring of the financial resources that were being allocated to them. The need of keeping an eye on the monies was emphasized, as it improved their prudent use for the intended purposes and the value they created for the recipients. It was possible to reduce instances of project resource diversion to interests and purposes outside the project scope and work plans by keeping an eye on financial resources. Keeping an eye on how the funds were used made sure that projects were carried out within the allotted time and within budget. The research highlighted the need of surprise audits in cases when there is suspicion of financial institutions misusing their resources. Nonetheless, this study's environment differs and is more project-specific than the ones under consideration here.

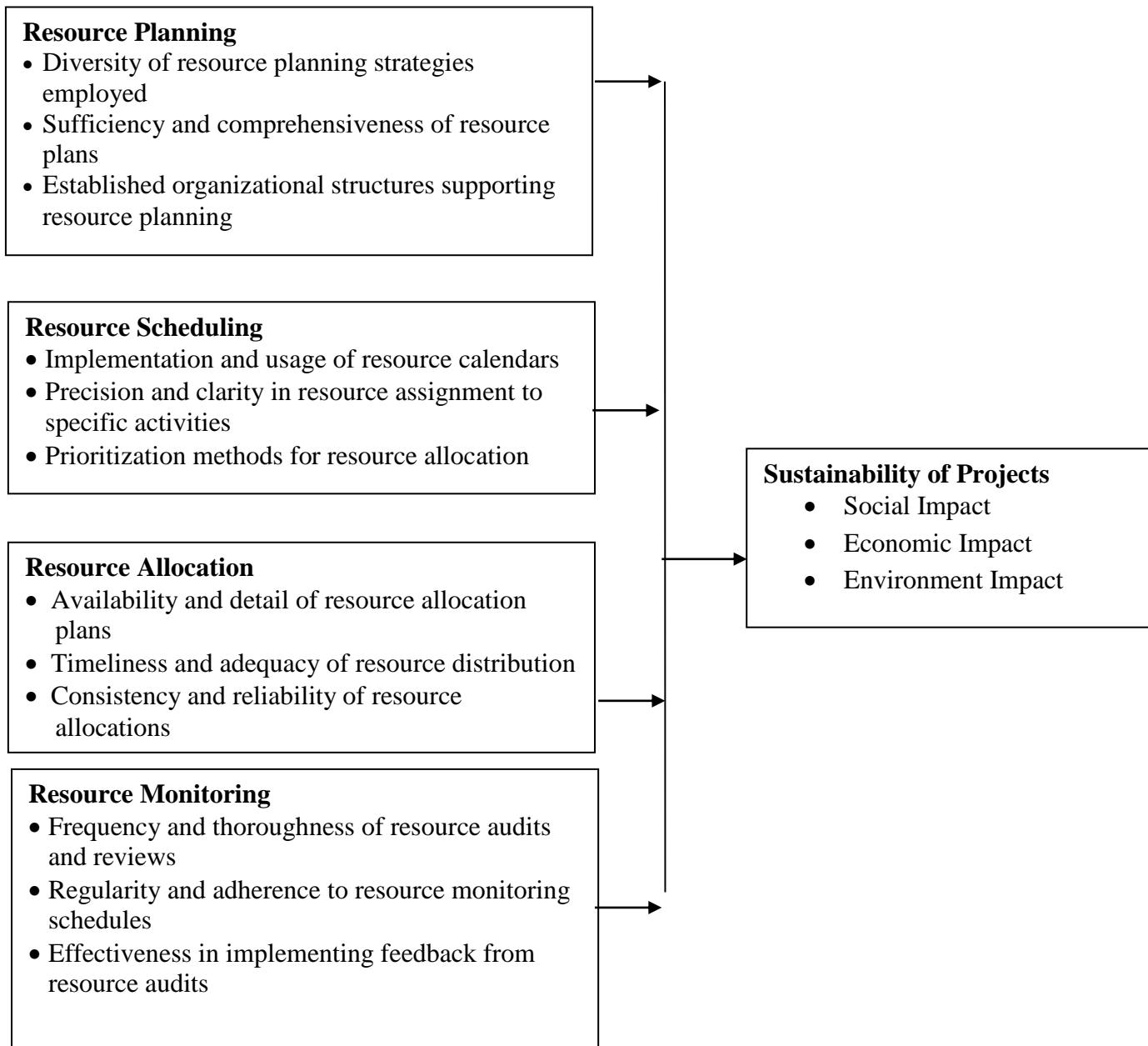
Jha and Iyer (2018) analysed the key factors influencing high-quality building projects in India's construction sector. A descriptive survey design was used in the research. From this study, we learned that keeping an eye on project resources and providing timely feedback greatly enhanced the quality of the projects we oversaw during their execution. Attaining the projected project quality was made possible via thorough monitoring and timely reporting of any instances of improper use of project resources, including material, labor, plant and equipment, and funds. Nevertheless, there will be a contextual gap as the research will take place in a different environment and concentrate on other initiatives from the ones that were investigated in this study.

2.4 Conceptual Framework

Figure 2.1 displays the study's conceptual framework, which explains the relationships between the study's variables. The four distinct parts of the independent variable that make up resource management methods are planning, scheduling, allocation, and monitoring. The dependent variable is the longevity of water projects.

Independent variable

Dependent variable



Source: Researcher (2024)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In this part, the research methodologies and processes that the researcher used to conduct the study are outlined. The document details the study's intended design, the population to be studied, the sampling methods, the data collection and analysis techniques, and any ethical considerations that the researcher had while doing the research.

3.2 Research Design

The researchers in this study used a descriptive survey approach. This design was taken into consideration since it allows for the accurate and efficient representation of the variables or elements that are pertinent to the research issue. Tana River County's county administration has implemented a number of resource management strategies, and this study details those policies and how they have affected the long-term viability of water projects in the county. Furthermore, the design aims to provide an unobstructed view of the setup in its natural state (Burns & Grove, 2003). As a result of its implementation, the true picture of how Tana River County's water projects' resource management techniques affected their long-term viability became apparent.

3.3 Target Population

Tana River County, Environment, Water, Natural Resources & Climate Change (2023) identified 83 project stakeholders, including 5 county officials from the County Environment, Water, Natural Resources & Climate Change, 13 project managers, and 65 members of the project management committee. These individuals were involved in all thirteen large-scale water projects that Tana River County completed between 2017 and 2022. Collecting first-hand accounts from those with a stake in the county's water project implementation will allow the researcher to draw impartial conclusions on pressing matters pertaining to the

administration and completion of the many water projects taking place across the county. It is essential to include several stakeholders in the research since depending just on the county authorities' replies might result in biased information or an inaccurate portrayal of the reality on the ground regarding the major study variables, which could impact the study's results.

Table 3.1: Target-Population

Project Stakeholders	Target-Population
County Environment, Water, Natural Resources & Climate Change-officials	5
Committee Members	65
Managers for the projects	13
Total	83

Source: Tana River County Environment, Water, Natural Resources & Climate Change (2023)

Due to manageable small population, the researcher used a census.

3.4 Data Collection Instruments

The emphasis was on primary data, with data collected via semi-structured questionnaires. The research variables and the participants' demographic information were both included in the various parts of the questionnaire. The bulk of these questions were based on a degree of agreement scale (Likert) with five points, as shown in Appendix II.

3.5 Data Collection Procedures

The researcher hired two competent research assistants to assist with the distribution of surveys using the "drop and pick later" approach. After two weeks, we checked in with the responders again to make sure they had time to think about and answer all of our questions.

After obtaining the participants' agreement and the necessary approvals from relevant authorities such as the county government, the Kenyatta University, and NACOSTI, this was carried out. We obtained a research authorization from NACOSTI, the National Commission for Science, Technology, and Innovation.

3.6 Pilot Study

The researcher chose eight water project managers to participate in the pilot study in Tana River County. The primary research did not include the eight managers.

3.6.1 Test for Validity

When a research instrument measures what it should in a study, we say that it is valid (Kothari, 2004). This is why the questionnaire was structured with sections that each included questions relevant to a certain goal; this approach ensures construct validity. In order to ensure that the questions answered are relevant and meaningful, the project supervisor and two project managers from the Ministry of Water were requested for their feedback on the tool's content validity. The researcher listened to their feedback and made any necessary changes to the questionnaire before beginning the main investigation.

3.6.2 Test for Reliability

According to Sekaran and Bougie (2016), a research tool's reliability is its capacity to consistently assess variables in a way that yields consistent and stable findings. The reliability of the questionnaire may be assessed with the use of the Cronbach alpha test. The internal consistency coefficient is a simple way to measure the correlations between items on the same trial and whether or not several items evaluating the same broad notion provide the same scores. This research found that a cutoff threshold over 0.7 was mostly appropriate.

3.7 Data Analysis and Presentation

Methods for evaluating data were both quantitative and qualitative. To summarize the information gathered from the open-ended surveys, the data was thematically analyzed and, where applicable, coded. For every topic, brief summaries were provided. The focus of theme analysis is to find, evaluate, and document recurring ideas or patterns in the data (Guest, 2012). Quantitative data was analyzed with the use of the Statistical Package for the Social Sciences. Prior to the analytic process, data was cleaned and coded. Data in the form of conclusions and descriptions was retrieved using this method.

In order to illustrate the basic characteristics of the obtained data, descriptive statistics were extracted, which include frequencies, percentages, standard deviation, and means. According to Sekaran and Bougie (2009), they helped the researcher by providing basic summaries of the study's variables and sample. Correlation and regression analyses made up the inferential analysis in this research. When looking for potential relationships between the variables being studied, correlation analysis is often used (Cohen, West, & Aiken, 2014). The correlations between the resource management methods studied and the sustainability of water projects in Tana River County were determined using Pearson correlation coefficients (r). These values indicated the intensity, direction, and relevance of the relationships. The researcher relied heavily on the correlation test to help identify the most relevant resource management methods to include into the study's final model.

In order to find out how resource management practices—including planning, scheduling, allocating, and monitoring—relate to the long-term viability of water projects in Tana River County, Kenya, regression analysis was used. Consequently, in order to quantify the impact of each resource management strategy on the sustainability of water projects in Tana River county, Kenya, a multivariate regression analysis was conducted. This is also shown by the model in equation 3.1;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where:

Y = Water Projects Sustainability

X_1 = Resource Planning

X_2 = Resource Scheduling

X_3 = Allocation of Resource

X_4 = Resource Monitoring

$B_1, \beta_2, \beta_3, \beta_4$ =Beta coefficients

B_0 =Constant Term

ε =Error term

The F statistic and its corresponding p value were used to evaluate the population fit of the regression model and the independent variables' predictive power of water project sustainability in Tana River county, Kenya. To further investigate if the independent variables individually significantly impact water project sustainability, the researcher further examined the regression coefficients, t-statistics, and p-values that went along with them. The findings were presented using graphical and tabular formats.

3.9 Ethical-Considerations

To ensure the study's validity, many ethical considerations were considered throughout the process. While conducting the study, the researcher maintained objectivity and candor. To increase the likelihood of participants' free will, they made sure no one could pressure them into taking part in the research. All information gathered was treated with the utmost secrecy, and respondents were allowed to remain anonymous while filling out the survey. In order to complete the academic project in accordance with the standards of Kenyatta University, the researcher persisted in focusing on the primary purpose of the study. The subjects were treated fairly and their agreement was sought after. The researcher also made sure that the study was conducted independently.

CHAPTER FOUR

RESEARCH FINDINGS, INTERPRETATIONS AND DISCUSSIONS

4.1 Introduction

The data collected from the field was analyzed and presented in this chapter using descriptive and regression statistics, figures, graphs, and tables were used to present the data.

4.2 Response Rate

Tana River County respondents completed 83 questionnaires in total, and Table 4.1 displays the return rate.

Table 4.1 Response Rate

	Frequency	Percent
Response	63	75.9
Non-response	20	24.1
Total	83	100.0

Source: Field Data (2023)

According to Table's data, of the 83 respondents, 63 returned their questionnaires, yielding a response rate of 75.9%; the remaining 24.1% of respondents did not reply. The results show that there was sufficient data for analysis from the field, with an overall response rate of 75.9%. This follows the recommendation of Mugenda and Mugenda (2003), who show that data analysis is best done with a response rate of 70% or above.

4.3 Reliability Tests Results

The results on reliability were presented in Table 4.2.

Table 4.2 Reliability Results

	Alpha Score	No. of Items	Comments
Sustainability of Water Projects	0.876	7	Reliable
Resource Planning	0.888	8	Accepted
Resource Scheduling	0.899	7	Accepted
Allocation of Resource	0.798	7	Accepted
Resource Monitoring	0.867	8	Accepted
Average Score	0.866		

Source: Field Data (2023)

Table 4.2 reveals that the coefficient values for resource scheduling (0.899), sustainability of water projects (0.876), resource planning (0.888), allocation (0.798), and monitoring (0.867) were determined. Following the advice of Sekaran and Bougie (2016), the instrument's average coefficient value of 0.866 indicates its reliability.

4.4 Background-Information

The result presents information relating to the age of the respondents, gender, educational level and work experience.

4.4.1 Age of the Respondents

This section presents results on the gender of the respondents; Figure 4.1 presents the results. The results shown in Figure 4.1 indicate that 61% of the respondents were male, and 39% were female. This suggests that there was a good representation of both genders among the employees who took part in the survey. In order for the research to accurately reflect men and women, we needed to know the respondents' gender. This suggests that men and women should be treated equally in the workplace when it comes to project performance.

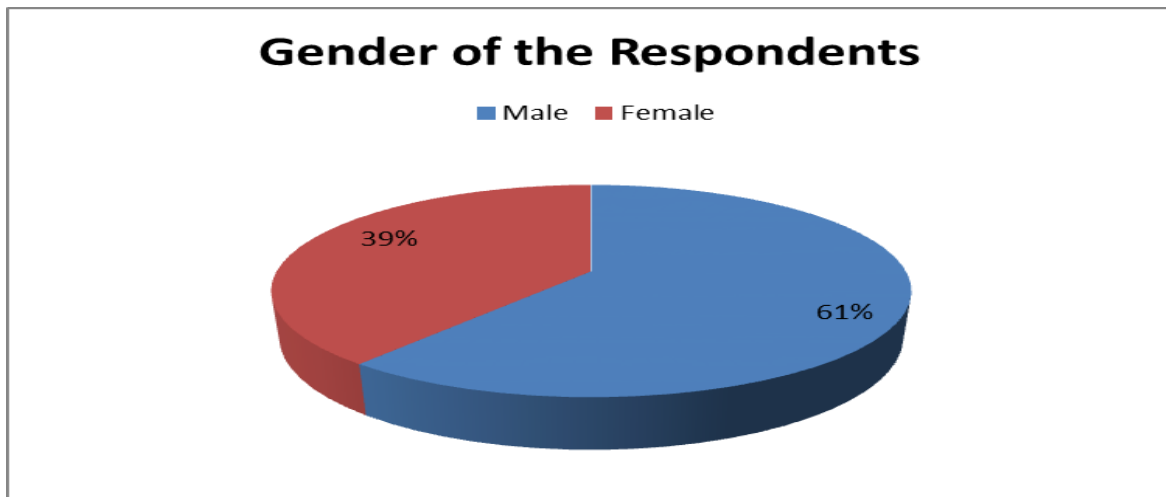


Figure 4.1 Gender of the Respondents

4.4.2 Age of the Respondents

This section provides the respondents' age ranges. You can see the results in Table 4.3.

Table 4.3 Age of the Respondents

	Frequency	Percent
25Yrs -34Yrs	11	15.9
35Yrs – 44Yrs	53	76.8
45Yrs & above	5	7.2
Total	69	100.0

Source: Field Data (2023)

Table 4.3 shows that the majority of respondents (76.8%) were in the 35–44 age bracket, with 15.9% falling into the 25–34 age bracket and 7.2% falling into the 45+ age bracket. Meaning people of all ages work on different initiatives in Tana River County. Because people of various ages bring unique life experiences, viewpoints, expectations, and work styles to the table, this research placed a premium on a diverse sample of ages.

4.4.3 Education Level

The study's results, shown in Table 4.4, were to ascertain the highest level of education achieved by the respondents.

Table 4.4 Education Level

	Frequency	Percent
Phd	2	2.9
Masters	4	5.8
Degree Certificate	61	88.4
Diploma Certificate	2	2.9
Total	69	100.0

Source: Researcher (2023)

Based on the results in Table 4.4, the largest proportion of respondents (88.4%) reported having obtained an undergraduate degree as their highest level of education. This was followed by a master's degree (5.8%), a diploma certificate (2.9%), and a PhD (2.9%). The success of a project heavily relies on an employee's higher education level as it equips them with the necessary knowledge and skills to effectively adapt to changing project needs.

4.4.4 Working Experience

The section presents results on working experience of the employees working in various sections within the projects targeted. The results were presented in Table 4.5.

Table 4.5 Working Experience

	Frequency	Percent
Less Than 1 Year	8	11.6
2 to 3 Years	12	17.4
4 to 5 Years	19	27.5
More Than 5 Years	30	43.5
Total	69	100.0

Source: Researcher (2023)

According to Table 4.5's findings, the majority of respondents—43.5%—indicated they had worked in project related tasks for more than 5 years. Additionally, 27.5% had worked for 4 to 5 years, 17.4% had 2 to 3 years, and 11.6% had less than a year work experience. The results indicate that a majority of the participants had extensive professional experience, which enabled them to provide suitable answers to the study's questions.

4.5 Descriptive Analysis Results

The descriptive data was analyzed using Standard Deviation (SD) and Mean (M). The study-specific factors determine how the results are presented.

4.5.1 Resource Planning and Sustainability of Water Projects

The section presents results on resource planning in water projects in Tana River county, Kenya. Table 4.6 presents results.

Table 4.6 Resource Planning and Sustainability of Water Projects

	Mean	Std. Deviation
The county's water projects are meticulously planned with all the necessary resources.	4.12	.72497
All of the county's water project cycles have used resource plans that are more than sufficient.	4.04	.44521
When the county's water project management teams are preparing to allocate resources, they use preexisting frameworks.	4.28	.36116
Project resource planning is an extremely regimented procedure across the county.	4.10	.53996
Team members in charge of project management in the county have begun using software for resource planning.	4.53	.45280
Aggregate Score	4.21	

Source: Field Data (2024)

The results in Table 4.6 indicate a high level of agreement among respondents that resource planning practices are well-implemented within Tana River County's water projects, as evidenced by an aggregate mean score of 4.21. This positive perception is further supported by the relatively low standard deviations, particularly in the use of preexisting frameworks (0.36116) and the adoption of resource planning software (0.45280), suggesting a consensus among respondents on these aspects. These findings align with Abu El-alkass's (2021) research on Gaza strip construction contractors, which emphasized the critical role of meticulous planning, particularly labor planning, in project cost management and success.

Although this study focused on a different sector, the emphasis on thorough planning resonates with the high ratings for meticulous resource planning (mean of 4.12) and sufficient resource plans (mean of 4.04) in Tana River County, indicating a shared understanding of the importance of detailed planning for project sustainability.

Similarly, Kumari and Vikranth's (2021) study on Indian highway projects highlighted that inadequate planning led to underutilized resources, underscoring the need for comprehensive material and manpower planning. Tana River County's high scores for using preexisting frameworks (4.28) and regimented planning procedures (4.10) demonstrate a structured approach to resource planning, effectively addressing the inadequacies noted by Kumari and Vikranth. Additionally, Umulisa, Mbabazize, and Shukla's (2020) research on the Agaseke Project in Rwanda found that effective resource planning, including human resource and financial planning, significantly impacts project success. The high mean scores in Tana River County for various planning aspects support the notion that detailed planning is crucial for sustainability.

The use of resource planning software, which had the highest mean score (4.53), underscores the alignment with Umulisa et al.'s findings on the importance of technology in planning processes. Sushma et al.'s (2019) study on the use of Primavera software in Indian road building projects concluded that proper project resource planning is essential for managing delays and ensuring efficiency. The high score for software use in Tana River County reflects a similar recognition of the importance of technology in enhancing planning accuracy and resource flow. Lastly, Shadrack's (2018) study in Nairobi County revealed that unstructured resource planning led to delays and shortages. In contrast, Tana River County's structured and formalized planning processes (mean of 4.10) and use of preexisting frameworks (4.28) indicate a more organized approach, likely contributing to better project sustainability

outcomes. These structured approaches directly address the issues of delays and resource shortages identified in Shadrack’s study. Overall, the findings from Tana River County validate the importance of meticulous and structured resource planning practices, as highlighted in comparative empirical studies, emphasizing their critical role in achieving project sustainability.

4.5.2 Resource Scheduling and Sustainability of Water Projects

This section delves into the interpretation of the results regarding resource scheduling and its impact on the sustainability of water projects in Tana River County.

Table 4.7 Resource Scheduling and Sustainability of Water Projects

	Mean	Std. Deviation
When planning sustainable county water projects, all available resources are carefully evaluated at every stage of the process.	4.52	.56001
The county's water projects heavily rely on resource calendars.	4.63	.59121
The county's water project cycles are characterized by the effective allocation of resources to various project operations.	3.73	.50319
Water project managers have a track record of effectively rearranging activities and resources to meet project goals despite budget and resource limitations.	3.30	.49867
There has been effective prioritizing of resources when there are conflicting demands for those resources.	4.50	.49936
Project management teams in the county have started using industry-standard software for scheduling resources.	4.00	.49786
Aggregate Score	3.99	

Source: Researcher (2024)

The aggregate mean score of 3.99 from Table 4.7 indicates a generally positive perception of resource scheduling practices in Tana River County's water projects. High mean scores for the reliance on resource calendars (4.63) and the careful evaluation of resources at every stage (4.52) suggest that these practices are well-implemented and crucial for the

sustainability of these projects. However, the lower mean score for the effective rearrangement of activities and resources (3.30) indicates some challenges in flexibility under budget and resource constraints. These findings align with Dong, Li, Zhao, Li, and Yan's (2021) study, which highlighted the critical role of resource scheduling in improving resource utilization efficiency and creating successful project schedules, emphasizing that inefficient resource scheduling could lead to increased expenses and resource wastage.

Similarly, Memon and Zin's (2021) research on Malaysia's construction industry found that resource scheduling methods, including resource calendars and prioritizing resources, were essential for meeting project deadlines and managing resources efficiently. The high mean scores for effective prioritizing of resources (4.50) and the use of industry-standard scheduling software (4.00) in Tana River County suggest comparable practices, reinforcing the critical role of structured scheduling in project sustainability. Joshi and Patil's (2021) evaluation of resource scheduling in building projects emphasized the importance of creative planning and reducing unanticipated project losses through precise resource scheduling. The lower mean score for the effective rearrangement of activities and resources (3.30) in Tana River County suggests some challenges in this area, though the high scores for other aspects indicate generally strong practices.

This partial alignment with Joshi and Patil's findings highlights areas for improvement in flexibility and adaptation within Tana River County's water projects. Lamka and Masu (2018) investigated resource scheduling in Nairobi County and found that improper scheduling led to resource misallocation and project delays. The high scores for reliance on resource calendars (4.63) and careful resource evaluation (4.52) in Tana River County suggest that similar issues are being effectively addressed, indicating that the county has adopted structured and efficient resource scheduling practices to avoid the pitfalls observed in Nairobi County's

construction projects. Overall, the results demonstrate a generally positive implementation of resource scheduling practices in Tana River County, aligning with empirical studies that emphasize the critical role of resource scheduling in project sustainability. However, some challenges remain in the effective rearrangement of activities and resources under constraints, indicating areas for further improvement.

4.5.3 Resource Allocation and Sustainability of Water Projects

This section interprets the results related to resource allocation and its impact on the sustainability of water projects in Tana River County.

Table 4.8 Resource Allocation

	Mean	Std. Dev
The county's water projects are funded in accordance with predetermined plans that specify how those funds will be distributed.	3.93	1.066
Sustainability of water projects in the county are always funded in a sufficient and effective manner.	4.80	.838
Throughout the course of the county's water projects, resource allocations remain stable and according to plan for all operations.	4.81	.527
Timely distribution of funds is essential for the long-term viability of the county's water projects.	4.83	.379
The distribution of resources for the implementation of water projects in the county is guided by preexisting organizations.	3.96	.455
Aggregate Score	4.47	0.653

Source: Field Data (2024)

The aggregate mean score of 4.47 from Table 4.8 indicates a highly positive perception of resource allocation practices in Tana River County's water projects. High mean scores for statements such as the stability and adherence to resource allocation plans (4.81), timely distribution of funds (4.83), and sufficient and effective funding (4.80) suggest that resource allocation practices are well-implemented and crucial for the sustainability of these projects. These findings align with Engwall and Jerbrant's (2020) study, which highlighted that

inadequate resource allocation and short-term problem-solving in multi-project systems led to delays and failure to meet project objectives.

Similarly, Bulle and Makori's (2019) research on the Kenya Urban Roads Authority projects found that sufficient resource allocation positively impacted project performance and adherence to cost parameters, indicating that Tana River County's practices are consistent with successful project delivery. Additionally, Anunda's (2019) study on HIV/AIDS programs in Nairobi County emphasized the importance of sufficient financial and non-financial resource allocation for project success, which is reflected in the high scores for effective and timely funding in Tana River County. Gashuga, Kule, and Ndabaga (2019) also found that financial management and proper resource allocation improved project performance in Rwanda, aligning with the positive impact of resource allocation seen in Tana River County's water projects.

Murithi, Makokha, and Otieno (2018) emphasized the role of sufficient resource allocation in the timely completion of public building projects in Kenya's Trans-Nzoia county, further supporting the importance of stable and timely resource distribution in Tana River County's water projects. Lastly, Njiru's (2018) research on manufacturing enterprises in Nairobi County found a positive correlation between resource allocation and project execution, underscoring the efficiency and effectiveness seen in Tana River County's water projects. Overall, the results demonstrate a highly positive implementation of resource allocation practices in Tana River County, aligning with empirical studies that emphasize the critical role of resource allocation in project sustainability, though some differences in context and methodology should be noted.

4.5.4 Resource Monitoring and Sustainability of Water Projects

The data presented in Table 4.9 offers insights into the effectiveness of resource monitoring practices and their impact on the sustainability of water projects in Tana River County.

Table 4.9 Resource Monitoring and Sustainability of Water Projects

	Mean	Std.Dev
In order to keep tabs on how its water projects are spending their allocated funds, the county has a tried-and-true system in place.	3.4290	.45999
Water projects in the county are regularly and consistently audited for both financial and physical development in comparison to predetermined resource plans.	3.3343	.56663
On a regular basis, members of the county's transport and infrastructure committee visit the locations of the water projects and review the financial records associated with them.	3.2754	.59657
Supervisors of county projects place a premium on conducting timely and thorough audits of the water project's resource use.	3.5217	.55666
Timely results and comments are consistently delivered after audits and assessments of water project resources.	3.4348	.66673
Throughout the lifespan of water projects in the county, resource audit follow-ups are undertaken.	3.4348	.77567
Aggregate Score	3.4005	0.6014

Source: Field Data (2023)

The scores indicate a moderate level of agreement across various aspects of resource monitoring. Firstly, the mean score of 3.4290 suggests that there is a perception that the county has a reliable system in place to monitor how water projects are spending their allocated funds, with relatively low variability in responses (Std. Dev: 0.45999). Secondly, the mean score of 3.3343 indicates that there is a perceived regular and consistent audit process for both financial and physical development compared to predetermined plans, albeit with a slightly higher standard deviation (0.56663).

Thirdly, the score of 3.2754 for the visitations and financial record reviews by the county's transport and infrastructure committee suggests a perceived effort in oversight, though with room for improvement in consistency and effectiveness. The mean score of 3.5217 for the

premium placed on conducting timely and thorough audits indicates a relatively strong agreement on the importance of thoroughness in audits, with a moderate standard deviation (0.55666). Moreover, the scores for timely delivery of audit results (3.4348) and follow-up audits (3.4348) indicate that these practices are seen as moderately effective in the county. Overall, while there are existing monitoring mechanisms, there is a clear need for improvement in consistency, effectiveness, and thoroughness to ensure the sustainability and success of water projects in Tana River County, aligning with findings from previous empirical studies in related contexts.

The aggregate mean score of 3.40 from Table 4.9 indicates a moderate perception of resource monitoring practices in Tana River County's water projects. The scores suggest that while there are established systems for monitoring, regular audits, and follow-ups, there is room for improvement in these practices to enhance the sustainability of water projects. The findings are consistent with Mosago's (2020) study on the financial monitoring of international non-governmental organizations (INGOs) in Kenya, which highlighted that rigorous financial monitoring through site inspections, financial desk checks, and frequent financial review meetings significantly improved program outcomes. The research emphasized the importance of regular financial monitoring for cost-efficiency, social benefits, and overall program success, aligning with the need for consistent audits and follow-ups in Tana River County.

Ochieng's (2019) study on resource management in Kenyan mobile communications companies found that adequate measures for monitoring project assets led to better allocation of resources and reduced waste. The importance of performance monitoring and frequent financial audits for ensuring funds are used appropriately is reflected in the moderate scores for regular audits and timely audit follow-ups in Tana River County. However, the study's

focus on private sector projects highlights a contextual difference, as the current research examines public water projects.

4.5.5 Sustainability of Water Projects

The purpose of this research was to examine water project sustainability in Tana River County, Kenya. In Table 4.10, the findings are summarized.

Table 4.10: Sustainability of Water Projects

	Mean	Std. Dev
The project was acceptable to the clients	2.9203	.52597
The project met the expectations of the stakeholders	2.9148	.49936
The project was delivered within the agreed budget	2.9013	.49162
The projects changed the social lives of the community members	3.0021	.76548
The community was able to improve their living standards	3.1123	.65430
The projects have changed the economy within the county	2.8769	.65476
The environment has changed due to the impacts of the water projects	3.5466	.54637
Aggregate Score	2.9546	0.59858

Source: Field Data (2023)

The aggregate result indicated that majority of the water projects in Tana River county were not sustainable (Mean=2.9121, Std Dev=0.50565). The water projects moderately changed the social lives of the community members in Tana River ccounty, Kenya (Mean=3.0021, Std Dev=0.76548). To a moderate extent the community was able to improve their living standards (Mean=3.1123, Std Dev=0.65430). The projects have moderately changed the economy within the Tana River county (Mean=2.8769, Std Dev=0.65476). The study results indicated that the projects were moderately acceptable to the clients (Mean=2.9203, Std Dev=0.52597). The findings further indicated that the projects partially met the expectations of the stakeholders (Mean=2.9148, Std Dev=0.49936). Additionally, the findings indicated that the projects were not delivered within the agreed budget (Mean=2.9013, Std

Dev=0.49162). The environment has moderately changed due to the impacts of the water projects in Tana River county (Mean=3.5466, Std Dev=0.54637). This implies that the water projects that were initiated and completed by various government entities within Tana River County in the years 2017 to 2022 were unable to meet the stakeholders expectations in relation to their social, economic and environmental impacts.

4.6 Inferential Analysis

4.6.1 Correlation Analysis

The findings of the correlation analysis between the variables that were considered are presented in this section. Table 4.11 displays the findings.

Table 4.11 Correlations

		Planning	Scheduling	Allocation	Monitoring	Sustainability
Planning	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	69				
Scheduling	Pearson Correlation	.431**	1			
	Sig. (2-tailed)	.500				
	N	69	69			
Allocation	Pearson Correlation	.012	-.338**	1		
	Sig. (2-tailed)	.924	.505			
	N	69	69	69		
Monitoring	Pearson Correlation	-.028	-.325**	.960**	1	
	Sig. (2-tailed)	.819	.206	.200		
	N	69	69	69	69	
Sustainability	Pearson Correlation	.594**	.617**	.704*	.734**	1
	Sig. (2-tailed)	.000	.000	.011	.005	
	N	69	69	69	69	69

Source: Field Data (2023)

At the 95% confidence range, the correlations between the four variables—resource planning, scheduling, allocation, and monitoring—were weak and statistically insignificant. With a 95% confidence interval, the link between resource planning and the sustainability of water projects was robust and significant ($P=0.594$, $\text{sig}<0.05$). At a 95% confidence interval, the association between water project sustainability and resource scheduling was high and statistically significant ($P=0.617$, $\text{sig}<0.05$). At the 95% confidence interval, the association between the allocation of resources and the sustainability of water projects was substantial and statistically significant ($P=0.704$, $\text{sig}<0.05$). With a 95% confidence interval, the link between resource monitoring and the sustainability of water projects was robust and statistically significant ($P=0.734$, $\text{sig}<0.05$).

According to research by Li et al. (2018), water project sustainability is greatly affected by resource scheduling. Funds were allocated in a way that minimized administrative expenses, which improved efficiency prediction and decreased overall project risk (Gashuga et al., 2016). The research conducted by Ochieng (2019) found that projects were more likely to be sustainable when adequate measures were used to monitor and manage project resources. This guaranteed that money were spent correctly, according to plan, and with necessary permission.

4.6.2 Regression Analysis

The model summary, variance analysis, and regression coefficients are shown in this portion of the result. To see how well the independent variables described the changes in the dependent variable, look at the coefficient of determination, which is shown on the model summary. Coefficients showed a linear connection between the variables, and analysis of variance shows how well the model fits the data.

Table 4.12 Model Summary

Model	R	R-Square	Adjusted R-Square	Std. Error of the-Estimate
1	.887 ^a	.787	.774	1.48037

a. Predictors: (Constant), Planning, Scheduling, Allocation, Monitoring

Source: Field Data (2023)

A measure of how much of the dependent variable's variation can be accounted for by the independent variables either alone or in combination is the modified R², which is also known as the coefficient of multiple determinations. The four independent factors that were examined—resource scheduling, planning, allocation, and monitoring—account for 77.4 percent of the variation in the adjusted R square for water project sustainability in Tana River County, Kenya. That leaves 22.6% of the credit for water project sustainability going to variables that weren't included in this study.

Table 4.13 ANOVA^a

Model		Sum-of-Squares	df	Mean-Square	F	Sig.
1	Regression	518.382	4	129.596	59.136	.000 ^b
	Residual	140.255	64	2.191		
	Total	658.638	68			

a. Dependent Variable: Sustainability of Water Projects

b. Predictors: (Constant), Resource Planning, Resource Scheduling, Resource Allocation, Resource Monitoring

Source: Field Data (2023)

There is statistical significance in the model's predictions on the effects of planning, scheduling, allocating, and monitoring on the sustainability of government-sponsored water projects in Kenya (p-value = 0.000^b, < 0.05). A 5% threshold of significance yielded an F-value of 59.136. The whole model was significant since the computed F-value is bigger than the F-critical F-value (p value = 2.762).

Table 4.14 Coefficients^a

Model	Unstandardized- Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	14.040	3.270		4.294	.000
1 Resource Planning	.781	.153	.336	5.100	.000
Resource Scheduling	1.264	.135	.648	9.360	.000
Allocation of Resources	-.252	.330	-.162	-.764	.448
Resource Monitoring	1.167	.343	.709	3.398	.001

a. Dependent Variable: Sustainability of Water Projects

Source: Field Data (2023)

The study's regression equation was as follows:

$$Y = 14.040 + 0.781X_1 + 1.264X_2 + 1.167X_4$$

The coefficients in Table 4.14 provide valuable insights into the relationship between various resource management practices and the sustainability of water projects in Tana River County.

Firstly, the constant value of 14.040 indicates the estimated mean sustainability score when all independent variables are zero. Moving to the predictors, the positive coefficient for Resource Planning (0.781, $p < 0.001$) suggests that better planning of resources significantly enhances the sustainability of water projects. This aligns with findings from Umulisa et al. (2020), who found that effective planning of human, financial, and material resources positively impacts project outcomes. Similarly, the coefficient for Resource Scheduling (1.264, $p < 0.001$) indicates a strong positive relationship between scheduling resources and project sustainability, echoing the importance highlighted by Memon and Zin (2021) in Malaysia's construction industry.

Interestingly, the negative coefficient for Allocation of Resources (-0.252, $p = 0.448$) suggests that the specific way resources are allocated may not significantly influence project sustainability, which contrasts somewhat with findings from Engwall and Jerbrant (2020) regarding the impact of resource allocation on project delays and objectives. Finally, the

coefficient for Resource Monitoring (1.167, $p = 0.001$) indicates a positive relationship, implying that effective monitoring of resources enhances project sustainability. This corresponds with research by Kamwana and Muturi (2018) on World Bank-financed projects, where careful financial monitoring significantly improved project success rates.

Overall, these findings underscore the critical role of resource planning, scheduling, and monitoring in enhancing the sustainability of water projects in Tana River County. The results generally align with empirical studies emphasizing the importance of these practices across various project contexts, although the specific impacts can vary based on local conditions and project specifics. Future research could benefit from exploring these relationships further and considering additional factors that may influence project sustainability beyond resource management alone.

CHAPTER FIVE

SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a comprehensive summary of the findings, conclusions, and recommendations drawn from the study on the sustainability of water projects in Tana River County. The preceding chapters have delved into various aspects of resource management, monitoring, and planning, assessing their impact on the sustainability of these vital projects. This section synthesizes the results to provide a clear understanding of how different practices and factors influence project outcomes. Additionally, it offers conclusions based on the findings and proposes actionable recommendations for improving the sustainability and effectiveness of water projects in the region

5.2 Summary of Findings

The study found that resource planning significantly influences the sustainability of water projects in Tana River County. Specifically, the planning of human, financial, and material resources was found to be crucial for project success. Projects that had well-defined plans for resource procurement, training, and budgeting tended to perform better and achieve their objectives within the allocated time and budget.

Resource scheduling emerged as a critical factor in the success of water projects. Projects that effectively scheduled their resources, including labor, equipment, and materials, were better able to manage delays and optimize resource utilization. Proper scheduling ensured that tasks were completed on time and within budget, contributing to overall project sustainability

The findings regarding resource allocation were mixed. While initial resource allocation was important, the study found that projects often faced challenges due to inadequate allocation

adjustments over the project lifecycle. Projects that were able to reallocate resources as needed tended to perform better and maintain project sustainability.

Effective resource monitoring was found to significantly enhance the sustainability of water projects. Projects that implemented regular audits and assessments of resource use were better able to identify inefficiencies and take corrective actions promptly. This proactive monitoring helped to ensure that resources were used efficiently and effectively throughout the project duration.

5.3 Conclusions

Resource planning emerged as a fundamental pillar for the sustainability of water projects in Tana River County. The study found that meticulous planning of human, financial, and material resources significantly contributes to the success and longevity of these projects. Projects that had well-defined resource plans, including clear strategies for procurement, budgeting, and training, consistently achieved their objectives within the allocated time and budget. This not only ensured efficient resource utilization but also minimized wastage and improved overall project performance. The findings suggest that robust resource planning is crucial for enhancing project sustainability by providing a structured framework for resource management. By anticipating resource needs and potential challenges, project teams can proactively address issues and maintain project momentum. Moreover, the study's results align with existing literature, which emphasizes the critical role of resource planning in achieving project success across various sectors (Umulisa et al., 2020; Mosago, 2020; Kumari & Vikranth, 2021).

The study underscored the importance of resource scheduling in enhancing the sustainability of water projects in Tana River County. Effective scheduling of resources, including labor,

equipment, and materials, was found to be crucial for managing project timelines and budgets. Projects that implemented systematic scheduling practices were better equipped to mitigate delays, optimize resource utilization, and maintain project momentum. By aligning resource availability with project timelines, scheduling helped ensure that tasks were completed efficiently and within the specified timeframe. This proactive approach not only minimized project risks but also improved overall project outcomes. The findings highlight that resource scheduling plays a pivotal role in project sustainability by fostering operational efficiency and adherence to project schedules. The study's conclusions are consistent with previous research, which has demonstrated the positive impact of scheduling on project success in construction and infrastructure development (Memon & Zin, 2021; Joshi & Patil, 2021; Lamka & Masu, 2018).

The study found that resource allocation significantly influences the sustainability of water projects in Tana River County. Initial allocation of resources, both financial and physical, was critical for project initiation and early-stage progress. However, the study also identified challenges related to inadequate adjustments in resource allocation throughout the project lifecycle. Projects that were able to reallocate resources as needed, in response to changing project demands and environmental factors, demonstrated greater resilience and sustainability. Effective allocation of resources ensured that project objectives were met within the specified budget and timeline. The findings suggest that adaptive resource allocation is essential for mitigating risks and optimizing project outcomes. They are consistent with existing literature, which emphasizes the importance of strategic resource allocation in enhancing project efficiency and effectiveness (Engwall & Jerbrant, 2020; Bulle & Makori, 2019; Mogaka, 2017).

Resource monitoring was identified as a critical factor in enhancing the sustainability of water projects in Tana River County. The study found that regular monitoring and assessment

of resource use enabled project teams to identify inefficiencies, reduce waste, and optimize resource utilization. Projects that implemented robust monitoring practices, including regular audits and assessments, were better able to maintain transparency, accountability, and project integrity. This proactive approach not only improved project performance but also minimized the risk of resource misallocation and misuse. Effective resource monitoring contributed to the overall sustainability of projects by ensuring that resources were used efficiently and effectively throughout the project lifecycle. The findings are supported by previous research, which has shown that rigorous monitoring enhances project success by providing timely feedback and enabling corrective actions (Kamwana & Muturi, 2018; Jha & Iyer, 2018; Umulisa et al., 2020).

In conclusion, the study provides valuable insights into the factors influencing the sustainability of water projects in Tana River County. Resource planning, scheduling, allocation, and monitoring emerged as critical components for enhancing project sustainability. By adopting comprehensive resource management practices, project teams can improve efficiency, minimize risks, and achieve better project outcomes. The findings underscore the importance of strategic planning and proactive management in addressing the complex challenges associated with water project sustainability. Moving forward, it is recommended that project stakeholders prioritize robust resource management strategies to ensure the long-term success and resilience of water projects in the region

5.4 Recommendations of the Study

Effective resource planning emerged as a cornerstone for the sustainability of water projects in Tana River County. The study revealed that meticulous planning of human, financial, and material resources significantly enhances project outcomes. Projects that strategically plan their resources from the outset are better equipped to manage costs, avoid delays, and ensure the availability of necessary resources throughout the project lifecycle. Recommendations

include the development of detailed resource plans that account for all project phases, the adoption of advanced planning tools, and the integration of sustainability considerations into planning processes. By doing so, water projects can mitigate risks, improve efficiency, and enhance overall sustainability.

The study highlighted the critical role of resource scheduling in achieving project sustainability. Projects that effectively schedule resources, including labor, equipment, and materials, experience improved resource utilization and minimized wastage. Proper scheduling ensures that resources are allocated optimally, thereby reducing project delays and enhancing productivity. Recommendations for practice include the use of project management software for scheduling, establishing clear timelines for resource allocation, and conducting regular reviews to adjust schedules as needed. Policymakers are encouraged to incorporate scheduling best practices into project management guidelines to support sustainable project delivery.

Resource allocation was found to be pivotal in determining the success and sustainability of water projects in Tana River County. The study revealed that projects with adequate resource allocation, both in terms of financial and human resources, are more likely to achieve their intended goals within budget and on schedule. Effective allocation practices ensure that resources are distributed based on project needs, priorities, and available funding. Recommendations include establishing clear allocation criteria, monitoring resource use closely, and adjusting allocations as project needs evolve. Policymakers should consider implementing guidelines that promote equitable resource distribution and accountability to enhance project sustainability.

Resource monitoring emerged as a critical factor in ensuring the sustainability of water projects. The study demonstrated that projects with robust monitoring mechanisms are better

positioned to detect inefficiencies, prevent resource misuse, and address emerging challenges promptly. Regular monitoring of financial, physical, and human resources enables project managers to make informed decisions and optimize resource utilization. Recommendations include the implementation of regular audits, site inspections, and reporting mechanisms to track resource performance. Policymakers should prioritize transparency in monitoring practices and invest in capacity building to strengthen monitoring capabilities across project teams.

The study's findings underscored the importance of integrating sustainability criteria into project approval processes and policy development. Recommendations for policy and practice include the establishment of comprehensive resource management policies that prioritize sustainability, transparency, and accountability. Policymakers should promote stakeholder engagement throughout the project lifecycle to ensure community needs are met and address concerns proactively. Capacity building initiatives should be supported to enhance project management skills and foster a culture of continuous improvement. Adoption of technology solutions, such as project management software and monitoring tools, is also recommended to enhance efficiency and effectiveness. By implementing these recommendations, policymakers can support the long-term sustainability and success of water projects in Tana River County

5.5 Suggestions for Further Study

Future research could delve deeper into the specific methodologies and tools used in resource planning for water projects. Comparative studies across different regions or countries could explore variations in resource planning practices and their impact on project sustainability. Additionally, longitudinal studies could assess the long-term effectiveness of different planning strategies in achieving sustainability goals. Research could also investigate the

integration of climate change considerations into resource planning, as climate variability poses significant challenges to water project sustainability.

There is a need for further research into advanced scheduling techniques and their applicability to water projects. Comparative studies could evaluate the effectiveness of different scheduling software in optimizing resource allocation and reducing project delays. Longitudinal studies could examine how changes in resource availability and project scope impact scheduling outcomes over time. Additionally, research could explore the integration of artificial intelligence and machine learning in resource scheduling to enhance predictive capabilities and adaptive management practices.

Future research could focus on the equity implications of resource allocation in water projects, particularly in marginalized communities. Comparative studies across different sectors could assess how resource allocation practices differ and what lessons can be learned from successful resource allocation strategies in other development projects. Longitudinal studies could track the impact of varying resource allocation on project outcomes and community well-being over extended periods. Additionally, research could investigate the role of public-private partnerships in resource allocation and its impact on project sustainability.

There is a need for further research into innovative monitoring technologies and their impact on resource management in water projects. Comparative studies could evaluate the effectiveness of different monitoring systems in detecting inefficiencies and preventing resource misuse. Longitudinal studies could assess how changes in monitoring practices influence project sustainability over time. Additionally, research could explore the use of blockchain technology in enhancing transparency and accountability in resource monitoring, particularly in public infrastructure projects.

Future research could explore cross-cutting themes that integrate resource planning, scheduling, allocation, and monitoring into comprehensive frameworks for project sustainability. Comparative studies could examine how integrated resource management approaches contribute to sustainable development goals across different contexts. Longitudinal studies could assess the scalability and replicability of integrated resource management frameworks in enhancing project sustainability and community resilience. Additionally, research could investigate the role of governance structures and policy frameworks in supporting integrated resource management practices in water projects.

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APPENDICES

APPENDIX I:INTRODUCTION LETTER

Juma Jama
Tana River County
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0723098384

Dear Respondents,

RE: INTRODUCTION LETTER

I hope this letter finds you in good health and high spirits. My name is Juma Jama, and I am currently pursuing a Master of Business Administration (MBA) at Kenyatta University. As part of the requirements for my degree, I am conducting a research study titled "Resource Management Practices and Sustainability of Water Projects in Tana River County, Kenya."

The objective of this research is to examine the impact of various resource management practices on the sustainability of water projects within Tana River County. Given the critical importance of water resources and their management in ensuring long-term sustainability and community well-being, your insights and experiences are invaluable to this study.

To achieve a comprehensive understanding, I have developed a questionnaire designed to gather detailed information about resource management practices, challenges faced, and potential strategies for enhancing the sustainability of water projects. Your participation in this study is crucial, and I kindly request you to take a few moments to complete the enclosed questionnaire.

Please be assured that your responses will be treated with the utmost confidentiality and will be used solely for academic purposes. Your participation is entirely voluntary, and you may withdraw from the study at any point should you choose to do so.

The completed questionnaire can be returned to me via email at jjuma@gmail.com or through the research assistant name enclosed. Should you have any questions or require further information about the study, please do not hesitate to contact me at 072309838 or via email.

I deeply appreciate your time and effort in contributing to this research. Your input will play a significant role in enhancing our understanding of resource management practices and their impact on the sustainability of water projects in Tana River County.

Thank you for your cooperation and support.

Yours sincerely,

Juma Jama

MBA Candidate
Kenyatta University

APPENDICES II: QUESTIONNAIRE

Thank you for participating in this research study. This questionnaire aims to gather data on resource management practices and their impact on the sustainability of water projects in Tana River County, Kenya. Please answer each question as accurately as possible by selecting the option that best represents your opinion. Your responses will be kept confidential and used only for academic purposes.

SECTION A: DEMOGRAPHIC CHARACTERISTICS

1. Indicate your gender

Male []

Female []

2. Indicate your age brackets

25Yrs -34Yrs []

35Yrs – 44Yrs []

45Yrs & above []

3. What is your Education Level

Phd

Masters

Degree Certificate

Diploma Certificate

4. Indicate your years of Experience

Less Than 1 Year

2 to 3 Years

4 to 5 Years

More Than 5 Years

Section B: Resource Planning

No.	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Our organization employs a wide variety of resource planning strategies.					
2	The resource planning strategies used in our organization are innovative and diverse.					
3	The resource plans developed in our organization are sufficient for our needs.					
4	Our resource plans cover all necessary aspects comprehensively.					
5	Our organization has established structures that effectively support resource planning.					
6	The organizational structures in place enhance the efficiency of our resource planning efforts.					

Section C: Resource Scheduling

No.	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Our organization effectively implements and uses resource calendars.					
2	Resource calendars are an integral part of our scheduling processes.					
3	Resource assignments to specific activities are precise and clear.					
4	Resource allocation is prioritized effectively within our organization.					
5	The methods used to prioritize resources are effective.					
6	Our resource scheduling processes ensure optimal use of resources.					

Section D: Resource Allocation

No.	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Our organization has detailed resource allocation plans.					
2	Resource distribution is timely and adequate in our organization.					
3	Our resource allocations are consistent and reliable.					
4	Resource allocation processes are well-documented and detailed.					
5	Resources are allocated based on well-defined criteria.					
6	The timing of resource allocation meets our project needs effectively.					

Section E: Resource Monitoring

No.	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Resource audits and reviews are conducted frequently and thoroughly.					
2	Resource monitoring schedules are adhered to regularly.					
3	Feedback from resource audits is implemented effectively.					
4	Our organization regularly monitors resource usage.					
5	Resource audits provide useful insights for project management.					
6	The resource monitoring processes are effective in identifying issues.					

Section F: Sustainability of Projects

No.	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Our projects have a positive social impact on the community.					
2	The economic impact of our projects is significant and beneficial.					
3	Our projects are environmentally sustainable.					
4	The social benefits of our projects outweigh the costs.					
5	Our projects contribute positively to the local economy.					
6	Environmental sustainability is a key focus in our projects.					

Thank you for your cooperation and support in completing this questionnaire. Your input is greatly valued and will contribute significantly to the success of this research.