

**PROJECT MANAGEMENT CAPABILITIES AND SUSTAINABILITY OF  
WATER PROJECTS FUNDED BY THE COUNTY GOVERNMENT OF  
MAKUENI, KENYA**


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## DECLARATION

This is my own effort and has not been submitted to any other educational institute for an accolade. No section of it may be replicated deprived of the approval of the researcher and/or Kenyatta University.

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This research work was forwarded for evaluation with our consent as the University supervisors.

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## **DEDICATION**

I dedicate this endeavour to all my loved ones. Your tolerance, comprehension, and unwavering support during my academic tenure are greatly appreciated.

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I recognize my supervisor Dr. Kyalo for his continuous support, motivation and immense patience with me as I undertake this project. I would also like to convey thankfulness to my family members and colleagues for the encouragements and inspiration to follow through with this research project and for walking with me all along my academic journey.

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## OPERATIONAL DEFINITION OF TERMS

<b>Management Commitment</b>	Management commitment denotes the active involvement of senior management in all particular and vitally significant areas, including security, safety, quality, and the environment, as well as organizational programs.
<b>Stakeholder Participation</b>	Stakeholder participation is about involving all organizational and community members in the project activities. This study will consider aspects like stakeholders' participation in mobilization of resources, communication of vital information and decision making leading to their ownership of the project.
<b>Resource Allocation:</b>	Resource allocation is the exercise of distribution and management of resources such that the objectives of planning at the strategic level of an organization are promoted.
<b>Digital Inclusion</b>	Digital Inclusion in water projects refers to the incorporation and utilization of Information and Communication Technology (ICT) tools, systems, and infrastructure to enhance the planning, implementation, monitoring, and management of water-related activities.
<b>Sustainability</b>	Keeping the project in such a manner as to have a long term future of serving the community requirements.
<b>Sustainability of water projects</b>	Proper planning and management of water resource projects in such a way that it would be able to serve the present and future populations. In the context of the study, it will be measured by: service delivery, user satisfaction, community ownership of the project, continuity and general project improvement.
<b>Water Project Stakeholders:</b>	All individuals that engage in all activities in the implementation, running and maintenance of water projects. The individuals are drawn from people who come from the government, donor and local community.

## **LIST OF ABBREVIATIONS AND ACRONYMS**

<b>ANOVA</b>	Analysis of Variance
<b>ASALs</b>	Arid and Semi-Arid Lands
<b>CDF</b>	Constituency Development Fund
<b>GOK</b>	Government of Kenya
<b>ICT</b>	Information Communication and Technology
<b>M&amp;E</b>	Monitoring and Evaluation
<b>NACOSTI</b>	National Commission for Science Technology and Innovation
<b>NGO</b>	Non-Governmental Organization
<b>NWSS</b>	National Water Services Strategy
<b>RBV</b>	Resource-Based View
<b>RWS</b>	Rural Water Supply
<b>SEM</b>	Structural Equation Modeling
<b>SME</b>	Small and Medium-sized Enterprises
<b>SPSS</b>	Statistical Package for the Social Sciences
<b>SSA</b>	Sub-Saharan Africa
<b>TAM</b>	Technology Acceptance Model
<b>TOC</b>	Theory of Change
<b>WSS</b>	Water Supply System
<b>NUTS III</b>	Nomenclature of Territorial Units for Statistics (Belgium, Bulgaria and Denmark)

## ABSTRACT

Water infrastructure projects are vital for ensuring access to clean water and promoting sustainable development in rural areas. However, there is lack of sustainability of water projects in Makueni County caused by inadequate infrastructure a lack of community inclusion, insufficient finance, and a lack of usage of current technologies that directs supervision and maintenance operations as 67% of water projects in the county have been shut down for five years or more, forcing residents of the semi-arid region to trek 15-30 kilometers looking for water. This research project aimed at assessing the effect of project management capabilities on sustainability of water projects funded by the county government of Makueni, Kenya. This research was based on four specific objectives namely: To establish the effect of management commitment and the sustainability of water projects; to assess the role of stakeholder participation and the sustainability of water projects; to determine the influence resource allocation and the sustainability of water projects; and to ascertain the relevance of Digital Inclusion and the sustainability of water projects funded by the county government of Makueni, Kenya. This research was guided by the stakeholder theory, RBV theory and technology acceptance model. A descriptive research approach was employed in the study. Data was obtained from 43 completed water projects with a target population of 100 stakeholders. Stratified random sampling method was employed to select a sample size of 85 respondents. Primary data was gathered utilizing questionnaires which will serve as the instrument for data collection. Pilot test was conducted on the data collection instrument to confirm the validity and reliability of the data measured by Cronbach's Alpha test. The quantitative data collected was analyzed with descriptive and inferential analysis and result were displayed in the form of tables, charts graphs and other statistical tools. All ethical considerations was fully upheld. The study established that management commitment ( $\beta=0.061$ ,  $p=0.004$ ), stakeholder participation ( $\beta=0.1085$ ,  $p=0.002$ ), resource allocation ( $\beta=0.223$ ,  $p=0.003$ ) and ( $\beta=0.3304$ ,  $p=0.002$ ) had a positive significant effect on the sustainability of water projects funded by the county government of Makueni, Kenya. The study concludes that the management commitment ensures that the necessary resources, including financial, human, and technical, are allocated to the water projects. Involving community members, local leaders, NGOs, and government agencies in planning, implementation, and monitoring ensures that projects meet community needs. By carefully prioritizing and distributing resources such as funding, manpower, and materials, the county government can ensure that projects are implemented efficiently and effectively. Digital inclusion improves communication and engagement with local communities which help to build trust and collaboration between the government and the community, leading to more sustainable and successful water projects. The study recommends that to enhance management commitment to water project sustainability in Makueni, Kenya can be through establishing clear goals and objectives. The County government of Makueni, Kenya should involve community members, local leaders, and other relevant stakeholders in the planning, implementation, and monitoring of these projects. Enhancing resource allocation methods involves implementing more efficient and effective strategies to ensure that the limited resources available for water projects in Makueni County are utilized in a sustainable manner. The County government should invest in technology infrastructure such as mobile apps and online platforms that provide real-time information on water availability, quality, and usage.

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 Background of the Study**

Water is indispensable for the sustenance of all forms of life on Earth, encompassing humans, animals, and flora; therefore, a continuous supply of this resource is imperative. Given that numerous regions experience minimal precipitation and that local communities rely on anthropogenic water management initiatives, the sustainability of such projects is of paramount importance. It is crucial for these projects to be meticulously maintained to ensure that communities can consistently benefit from water resources for both economic and domestic purposes (Nyanchaga, 2016). In order to secure this critical resource, it is essential for governmental entities, philanthropic organizations, and local populations to collaborate effectively to alleviate any adverse consequences that may lead to undesirable outcomes; otherwise, the potential for human fatalities remains a significant risk. Consequently, (Cruickshank & Grover, 2012) advocate for the innovation of alternative water sources such as boreholes, dams, and water pans, alongside the preservation and safeguarding of existing natural water bodies including rivers and lakes. The concept of engineered water projects emerged due to the fact that numerous areas around the globe do not experience consistent precipitation all thru the year, and certain communities lack access to natural water sources.

In developed countries, forecasts indicate that by the year 2050, one in four individuals globally will confront recurrent water scarcity (UNDP, 2020). By the year 2030, the sustainable development goals aim to achieve a multitude of objectives, including universal access to potable water and the implementation of integrated water resource management across all phases. The Tanzanian government consented to these

conditions by privatizing water service provision; however, it ultimately defaulted on its obligations to investors, adversely affecting the long-term sustainability of water initiatives in Tanzania (Kilonzo & George, 2020).

Beratan (2020) posits that any proposed project necessitates comprehensive planning at each phase, which includes securing funding, identifying domain experts, appointing managers to supervise the endeavor, and engaging all relevant stakeholders. Numerous community-oriented water supply initiatives worldwide encounter significant obstacles in sustaining their operations. In India, studies reveal that 30% of rural water supply systems become non-operational within three years of their inception. This is despite initiatives aimed at transferring ownership to the local communities benefiting from the projects and enhancing the involvement of community members (Hutchings, Franceys, Smits & Mekala, 2017).

In developing nations, the initial success of providing water access to certain communities is often achieved following periods of considerable hardship. Various issues arise, including ineffective community management of water projects, elevated rates of infrastructure failure, inadequate service delivery, and insufficient maintenance of the projects. Hutchings (2018) recommended the adoption of a community management model that fosters participation from community members and the formation of water committees to oversee the management of water initiatives. Community members can contribute to the repair of water infrastructure, maintain the water systems, supply locally sourced construction materials, and serve as a labor source for the projects. Furthermore, they should engage in decision-making processes to ensure the sustainability of the water initiatives.

Numerous nations across the African continent grapple with substantial challenges in the provision of safe and potable water for consumption and household utilization among their populace. The predicament is exacerbated by the ongoing population growth in Africa, coupled with the urban migration trend, which intensifies the demand for piped water infrastructure (Chowns, 2015). Merely 56% of the overall population in Sub-Saharan Africa (SSA) is connected to a water distribution system, while 48% of individuals residing in rural areas depend on unrestored water sources, with 22.5% of these rural water systems rendered non-functional (Behailu, Pietila & Katko, 2016). At certain junctures, the prevalence of non-operational water sources can escalate to 35%, and the rate of operational failure may reach 60%, resulting in many Sub-Saharan African nations experiencing acute water shortages, with some lacking adequate and consistent water resources throughout the year. The situation is particularly dire in densely populated regions, where the limited water supply and its associated distribution systems are further strained to meet the needs of the entire population (Tadesse, Bosona & Gebresenbet, 2013).

The water supply sector throughout the African continent predominantly depends on governmental structures that have proven ineffective, thus relying on donor-funded initiatives, as articulated by Akali et al., (2014), who further elucidate that impoverished Nigerians have benefitted from international donors in their quest for access to clean and safe water sources. The provision of water has adhered to a conventional methodology that confines projects to a specified and limited duration. This methodology has been beneficial for donors and non-governmental organizations (NGOs), yet it diverges markedly from the fundamental principles and tenets of sustainability. A significant portion of northern Africa endures persistent drought conditions, while numerous urban centers in Sub-Saharan Africa encounter substantial

challenges in securing clean and safe water supplies. The impoverished urban dwellers are compelled to depend on uneven water deliveries to their residences for their survival. According to Dos Santos et al., (2017), approximately fifty percent of the population in SSA countries lack access to safe water, with fourteen nations having reported experiences of acute water stress, and an additional eleven countries poised to join the growing cohort of African states facing severe water stress by the year 2025. The governments of African nations have acknowledged the formidable challenges they encounter in delivering water supply services to their citizenry, with many failing to provide clean and safe water. Concurrently, these governments have invested in water initiatives that have not maintained operational sustainability over extended periods, resulting in a failure to attain health and well-being for the populace, and communities forfeiting potential investment opportunities.

Kenya faces comparable issues in terms of water supply services, which influence cleanliness and people's health. Despite significant investment by the national and county governments, and the donor community, the situation has only improved slightly. The water supply situation is especially terrible in rural areas where there is no functioning water delivery infrastructure and in densely populated disadvantaged urban areas known as slums. Wote, Makueni's capital suffers major water shortages, with minimal fresh water available to the residents. Safe and clean water supply, which is regarded as a fundamental human right, is not available to all (Owino *et al.*, 2015). As the population continues to rise at a rapid pace, more than 20 million people lack access to clean piped water, and for those who have, the supply is unstable and variable. According to public ratings, the Water Supply System (WSS) has performed poorly because only 60% of urban people have access to clean water, 20% of those living in

slums or urban poor areas, and 40% of rural dwellers have access to clean water (Kwena, & Moronge, 2015).

Makueni County faces significant challenges in ensuring the sustainability of county-government funded water projects. Despite substantial investments by the government and various stakeholders, access to clean and safe water remains limited, particularly in rural areas and densely populated urban slums (Owino *et al.*, 2015). The county has experienced water shortages, inadequate infrastructure, and inconsistent water supply, affecting the well-being and development of its residents (Kwena & Moronge, 2015). It is imperative to address these concerns and enhance the sustainability of water initiatives in Makueni County.

In recent years, the county government of Makueni has been actively working towards improving water supply services and enhancing project management capabilities. Efforts have been made to invest in infrastructure development, community involvement, and capacity building initiatives (Makueni County Government, 2019). These initiatives aim to strengthen project management practices, ensure stakeholder participation, and integrate innovative technologies to enhance the sustainability of water projects in the county. However, challenges such as limited resources, inadequate maintenance, and governance issues persist (Musyoki, 2018).

To address these issues, it is essential to determine the function of project management capability in sustaining water projects. By improving project management practices, including planning, coordination, stakeholder engagement, and maintenance, the outcomes of water projects can be enhanced, leading to improved well-being and development for the community (Cook, Kimuyu, & Whittington, 2016).

### **1.1.1 Project Sustainability**

Water forms an essential component in human, animal and plant living, and therefore takes a constituent role in ensuring continuity of life thus any water sources should be protected to allow for continuous access to water. Abrams (2018) posits that sustainability entails the perpetuation of a project to consistently provide equivalent benefits to both project owners and beneficiaries. It aims to deliver the same functionality as outlined in the initial project plans, while maintaining or improving product quality. According to Nakagami, Kubota & Setiawan (2016), factors such as sufficient funds to cover upkeep and maintenance costs, provides good and qualified service providers capable of developing and supplying quality water projects, as well as people's well-being and growth, are required for project sustainability. This research will look at project planning in the context of maintaining water projects. Kwena (2015) observed that integrating all the stakeholders in project implementation enhances sentiments of ownership, which increases the long-term viability of commissioned initiatives. Every stakeholder must be included in the project's planners and teams that execute the plans at all phases till completion and commissioning (Kwena, 2015).

Juwana, Muttill & Perera (2016) mention that sustainability of water access points and water sources have values on education sector, the health impact, and water demand and poverty index. Braver (2018) depicts that long-term sustainability of water projects is determined by community involvement and engagement into the project, quality of the physical infrastructure and rules and regulations that support the project. When there is support from donors and well-wishers who come in to fund infrastructure for the water projects and do repairs; then sustainability is increased. Person, *et al.* (2017) shared that as the question of sustainability remains unanswered, then use of social

capital by building networks, rules and norms that encourage cooperation between the local communities can help in sustainability the projects.

Sustainability of projects largely depends on strong community governance and collaborative measures taken by community members. Adadzi, Coffie & Afetorgbor (2019) further reveal that the community members can ensure safety and security and take measures to conserve the resources. Protecting the project ensures that they keep enjoying the benefits from the project. While Egan & Agyemang (2019) advocates for use of modern technologies, public accountability, engagement and involvement in monitoring and control of the water projects. Kisang (2019) noted that to attain sustainability of water projects there is a need to train the locals to do minor repairs, use of modern technologies and adopting participatory management style.

Opoku, Ayarkwa and Agyekum (2019) revealed that in the construction projects, environmental sustainability failed barriers associated with perceived project costs, lack of information and knowledge on sustainability, technological challenges and lack of cooperation and uninterested local communities. To improve on sustainability, then these aspects have to be addressed. Similar position is held by Lillian & Mutiso (2019) noting that sustainability of water projects has limited access and supply of water to many Kenyans. The push by the government, the donor community and investors has failed to deliver projects that run continuously. Thus, Mwangangi (2016) advocates for demand-response approach that yields higher results in sustaining projects. The supply-driven approach limits involvement and participation of locals in the project and hence discouraged for it leads to failures in sustaining projects.

According to Kinyua, Mwangi & Riro (2015), the need for having water users' associations in improving ownership of the water projects is imperative. Creating a

sense of ownership of projects enhances chances for their sustainability. Whereas Njogu (2018) depicts that community participation and engagement will enhance success and sustain the water projects to continue serving the local communities for many years ahead. Furthermore, Hassan, Osore & Ong'ayo (2020) reveal that technical factors and availability of financial resources are the key determinants in capacity and ability to keep water projects running. Sustainability of the water projects involves access to clean water year-long from a functional and well-maintained water project. In this study, sustainability of water projects will be proxied in terms of continual water flow; year-long access to clean and safe water, functional water system and continuous repairs and improvement of the water projects.

### **1.1.2 Project Management Capabilities**

Project management capability is the ability of project partners to plan, execute, and manage activities to achieve desired results (PMI, 2017). It encompasses the skills, knowledge, methods, and resources used throughout the project lifecycle to ensure project success (Kerzner, 2013). In the financial management operations of the local government in Makueni County, Kenya, management is pivotal in ascertaining the overall success and sustainability of the project (UN-Habitat, 2010).

Good project management skills are important for various reasons. Firstly, it ensures proper planning and coordination of work, optimizing resource utilization and adherence to the schedule. This involves defining the project's goals, resources, and deliverables, and creating a detailed plan that outlines tasks, dependencies, and milestones. A proficient project management team can reduce stress and conflict during project completion by involving all stakeholders and ensuring their understanding of roles and responsibilities (PMI, 2017).

Additionally, the ability to manage the project includes effectively managing the risks and uncertainties that can appear in the course of the project. It entails recognizing potential risks, evaluating their probability and consequences, and formulating suitable mitigation plans. Effective risk management minimizes the impact on operational time, costs, and benefits by predicting and mitigating potential impacts. In the context of water projects, this includes addressing risks related to resource availability, environmental factors, and social acceptance (Flyvbjerg *et al.*, 2003).

Thirdly, project management skills encompass effective communication and collaboration with stakeholders. Clear lines of communication and regular updates ensure engagement of all stakeholders, including community members, hospital boards, and other relevant parties, keeping them informed of project progress and involving them in decision-making processes. This fosters trust, manages expectations, and resolves concerns or suggestions from stakeholders, contributing to the general success and sustainability of the project (Arora *et al.*, 2016).

Moreover, project management capabilities include the establishment of quality monitoring and control systems to assess project performance against predetermined criteria and objectives. This involves gathering relevant information, analyzing project progress, and making necessary adjustments to ensure objectives are met. Monitoring and control processes also facilitate early detection of discrepancies or issues, allowing for timely corrective actions. In the case of water projects, this encompasses activities such as water quality monitoring, infrastructure works, and service delivery to meet design standards and ensure customer satisfaction (Wang *et al.*, 2015).

To improve project management, organizations need to consider several important factors. Firstly, investing in a suitable and skilled project management team is crucial.

This includes hiring staff with project management qualifications and experience, as well as providing opportunities for continuing education and professional development. Additionally, utilizing project management processes, tools, and standards can enhance project execution and ensure consistency across multiple projects. Knowledge sharing and collaboration between project teams and other stakeholders are also important in strengthening project management practices. Regular project management meetings, lessons learned sessions, and sharing best practices foster continuous improvement and innovation in the project management process. Furthermore, the use of project management systems and software can improve overall project management capabilities by facilitating effective planning, monitoring, and reporting (Kerzner, 2013).

### **1.1.3 County Government Funded Water Projects in Makueni County, Kenya**

Kenyan's geographical zones is grouped into parts like the arid and semi-arid lands (ASALs) that cover 80% of the land; the Rift Valley, Coastal region, highlands, Lake Victoria basin and savanna. The ASAL region is inhabited by over 13million people, and approximately 35% of the population and over 60% of the population living below the global poverty index. This region is considered to be a high temperatures, low rainfall that is erratic and high rates of evapotranspiration. At times the rains come with high intensity that leads to runoff and soil erosion and most times the rainfall is below average ranging at 115-450 mm. The soils are shallow with little fertility making crop production and impossible task, while some areas have clay soil with high salinity and few areas have rich volcanic soils that is fit for crop production. The poor rainfall and bad soil mean that crop production is not done such that these ASAL regions are inhabited by pastoralists who keep local breed of animals (Titomet, 2017).

Makueni county is a water scarce county; it is considered to be an Arid and Semi-Arid Area. There are a couple of sources of water supply having a sum total of 18, 490 m<sup>3</sup>/day distributed within the county and receives an average of 114.97 millimeters per year. The volume is too low in consideration to the world bench mark set at 1000m<sup>3</sup>, hence the need for substitute water sources that must be maintain to continue provision of the essential commodity. The County Government of Makueni has invested in water harvesting, storage, treatment and distribution using different techniques. This includes construction of major dams like Kwa-mbila multipurpose dam harvesting of spring and river water, harvesting of rain water, institutional and household level water harvesting, storage and use (Mwangangi, 2016).

For every 10 rural water infrastructure projects, 6 of these facilities will become dysfunctional in the first three years after implementation and 40% of the water projects do not operate at full capacity. The water sector has been burdened with sustainability of its water supply projects since the government and donor community invests hugely in water project that collapse within a few years, leaving the people to suffer lack of sufficient and clean water. Despite the pressing need for water flow in the different projects, the chance for Rural Water Supply (RWS) projects to be non-functional and eventually abandoned is very high. Walking in several villages, it is common to see water projects that no longer supply water to the community due to poor maintenance or vandalism (Kosgei, Wanza & Wepukhulu, 2019). Studies done on sustainability measures undertaken on water projects create a gap by not considering project planning; thus, an indication in local knowledge gaps in sustainability of water projects.

County government-funded water projects in Makueni County are crucial for addressing water scarcity and enhancing sustainable development in the region. Through initiatives such as the Katilini Mega Dam project, solar-powered water pumps,

and water kiosks, the county government is making significant strides in improving water availability, quality, and accessibility. These projects align with the United Nations the Sixth Sustainable Development Goal is to achieve the availability of sustainable water and sanitation management of all. The county government's investment in water infrastructure is enhancing the lives of communities in Makueni County and fostering the region's socio-economic growth.

## **1.2 Statement of the Problem**

Makueni County has a population of 987,653 people according to 2019 census. Currently, only 17.7% households have access to clean piped water meaning that the county government and other stakeholders must make provision of clean, safe water for 82.3% of the population. The county has made provision for solar-powered drilled boreholes to cut operational costs and increase access to water. The main question still remaining is what measures will lead to sustainability of these water projects. As noted by Lilian and Mutiso (2019), 67% of water projects in the county have been shut down for five years or more, forcing residents of the semi-arid region to trek 15-30 kilometers looking for water. Inadequacy of infrastructure that guides oversight and upkeep activities is one of the factors given for lack of sustainability, a lack of community inclusion, insufficient finance, and a lack of usage of current technologies. Other factors encompass the allocation of resources to new initiatives instead of the upkeep of current water projects, along with functioning beyond a framework of fundamental standards and regulations (Ministry of Water and Irrigation, 2019).

The Government of Kenya has been dedicated to encouraging ongoing water sector changes, with the goal of ensuring both technical as well as structural feasibility for water projects (GOK, 2020). However, the lack of access to dependable water for the people in Makueni County has persisted despite previous financial environments,

formulated policies, and legislation, which has resulted in subpar socioeconomic indices (Mbatha, 2021). According to the National Water Services Strategy (2020) Kenya has massive problems of supplying safe clean water to her populace and it is estimated that 60 percent of the populace is in the urban environment and 40 percent in rural parts that have no regular water source.

Like other sub-Saharan African nations, Kenya is characterized by outdated technology that have put the implementation and continued existence of numerous community water projects in jeopardy. In order to guarantee that everyone in the community has access to water, there are not enough advanced devices, such as contemporary water-powered pumps, or well-designed water supply networks (Masombe & Omwenga, 2020). Due to this issue, residents of the community must trek great distances in search of water from other sources, defeating the purpose of these community water projects and endangering their sustainability.

All these figures are simply estimations because there exists no basic survey information to provide percentages. The Makeni County and other counties are yet to overcome challenges in the engagement of communities in sustaining water projects and those ASAL counties are worst in the practice. Water projects have failed to sustain their operations because of inadequate capacity during the construction process. Other factors are inefficient utilization of modern technologies, poor management techniques utilized by water managers, misuse of funds which result into bad quality projects, lack of training of staffs and the use of the public sector in the provision of services.

Muraya & Rambo (2019) observed that non-functional water systems are prevalent due to factors such as inadequate protection of water sources through fencing, vandalism of equipment including solar pumps for boreholes, hand pumps for shallow wells, and

water pans, and the community's reluctance to manage and upkeep these water sources, leading to the failure of water projects. Masika (2020) examined the sustainability of projects in Uganda and stakeholder participation but focused on health projects. Uwamariya, Safari, and Kengere (2021) examined the significance of stakeholder participation in relation to the project's sustainability but was done in Rwanda. Impacts of resource allocation on the success of residential construction projects in Nairobi City County, Kenya, were examined by Ronoh and Kirui (2020) but utilized purposive sampling technique. Alhassan and Adam (2021) examined how technology access and digital inclusion affect people's quality of life and utilized secondary data. In Sweden, Feise *et al* (2019) conducted research on digital inclusion and its effects on project team management

These studies have looked at other influencing factors for sustaining water projects but none has mentioned project management capability. The reviewed studies created gaps in context, concept and methodologies and these knowledge gaps needed further research in the area and this study shall fill the gap by exposing how project management capability can lead to sustainability of water projects within Makueni County, Kenya.

Thus, it is crucial to address the underlying problems and enhance the project management capability in county government-funded water projects. Enhancing project management practices can help mitigate delays, control costs, and ensure that water projects meet the desired performance and sustainability outcomes. By addressing these challenges, the county government can maximize the impact of its investments in water infrastructure, promote sustainable development, and improve the overall well-being of the communities in Makueni County.

### **1.3 Objectives of the Study**

#### **1.3.1 General Objective of the Study**

The research's main objective was to investigate the effect of project management capabilities on the sustainability of water projects in Makueni County, Kenya.

#### **1.3.2 Specific Objectives of the Study**

- i. To assess the effect of management commitment and the sustainability of water projects funded by the county government of Makueni, Kenya.
- ii. In order to ascertain the contribution of participation by stakeholders and the sustainability of the water projects funded by the county government of Makueni, Kenya.
- iii. To determine the influence resource allocation and the sustainability of water projects funded by the county government of Makueni, Kenya.
- iv. To ascertain the relevance of digital inclusion and the sustainability of water projects funded by the county government of Makueni, Kenya.

#### **1.4 Research Questions**

These were the research questions answered:

- i. What is the effect of management commitment on the sustainability of water projects funded by the county government of Makueni, Kenya?
- ii. What is the role of stakeholder participation in the sustainability of water projects funded by the county government of Makueni, Kenya?
- iii. How does resource allocation influence the sustainability of water projects funded by the county government of Makueni, Kenya?
- iv. How relevant is digital inclusion towards the sustainability of water projects funded by the county government of Makueni, Kenya?

#### **1.5 Significance of the Study**

Findings from the study would benefit the Makueni County Government and the stakeholders involved in water projects because it would provide insight into characteristics that can support the growth and success of water projects in Kenya, especially in Makueni County.

The results of this research would hold significance for policymakers and water project managers in their efforts to enforce regulations and employ effective project management methodologies that can positively impact project sustainability.

This research will enhance the current understanding of project management within the realm of water infrastructure development. The research would yield valuable information for project managers, policymakers, and stakeholders to enhance project management practices and improve project outcomes.

### **1.6 Scope of the Study**

The research concentration focused on investigating ability to manage projects and sustainability of water projects that the county government of Makueni, Kenya. Specifically, the study focused on management commitment, stakeholder participation, resource allocation and digital inclusion and their effects on sustainability of the water projects. The research narrowed down on understanding water projects financed by the County Government of Makueni. The geographic location was picked owing to this region's dry conditions and shortage of water, which prompts government and non-governmental organization involvement with water-related initiatives because of the region's yearly severe drought and famine. The research focused on water projects that have been funded in the last 8 years (2016-2023). The water projects of interest to the researcher were those that were still operational and serving the local communities in Makueni County.

### **1.7 Limitations of the Study**

The research expected the accuracy of the survey to be challenging since the information is based on self-reporting on project planning and sustainability measures. The respondents could not give accurate information but to prevent such, the researcher will have an introduction letter and research permit. The researcher clarified that the information is intended for scholarly reasons and hence requests honest ideas and perspectives. Secondly, the researcher was bound to experience financial constraints due to the increased costs for collecting field data; in curbing this, the researcher employed research assistants who lived in the research area to reduce travelling expenses.

Thirdly, the researcher was limited by the inaccessibility of some areas, rough terrain and vastness of the county. The researcher targeted only those respondents who can be easily accessed and used in the study so as to improve response rate. Fourth, unwillingness to take part in the study by targeted respondents; some respondents could be uncooperative and fear sharing information based on victimization. Confidentiality protocols were implemented for the participants, ensuring that the acquired material was utilized solely for educational reasons.

### **1.8 Organization of the Study**

The research is divided into different sections and the chapter one will handle the introduction and research background; followed by problem statement, objectives, significance and scope of the research. Chapter two tackles the reviews of literature both theoretical and empirical and its summaries and concludes with the conceptual framework. The third chapter covers the research methodology including design, populace, data gathering instrument, procedure and analysis. Chapter four deliberates the research findings and discussions. Chapter five deliberates the summary of the research's, conclusions, recommendations and propositions on what to be studied in the future.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter looks at the theoretical and empirical literature on sustainability of water projects. The literature is reviewed from theories that are related to variables in the study as well as the past empirical studies on project management. There are summaries of the findings which show the reviewed studies and expose the research gaps. The chapter will conclude with conceptual framework showing the inter-linkages of the variables and their indicators.

#### **2.2 Theoretical Review**

This subsection discusses the theories that involve resource-based theory, stakeholder theory and the technology acceptance model.

##### **2.2.1 Stakeholder Theory**

Stakeholder theory highlights the significance of considering the interests and demands of many stakeholders in project decision-making processes. Stakeholders can profoundly influence the success or failure of a project. By actively involving stakeholders and addressing their concerns, projects can enhance their chances of success and sustainability (Freeman, 1984). When considering the water projects, it primarily involves the scheduling and organizing of interrelated activities that ultimately facilitate the successful execution of the project. A competent manager in this field must be capable of effectively managing the expectations of the project's stakeholders. Failure to do so can result in project failure, particularly because stakeholders often require resources that have the potential to cause delays in these projects (Freeman, 2015). Meeting stakeholder expectations serves as a critical performance indicator in project management.

This theory sheds light on how the project delivery team can effectively manage the expectations of project owners. It emphasizes the importance of ascertaining robust communication channels within the organizational structure of the firm and possessing the skills to coordinate activities. Furthermore, it highlights the significance of interpersonal skills in effectively handling people, which in turn leads to enhanced client satisfaction with building construction projects. The theory emphasizes the essential role of the contractor's firm structure and the contractor's skills in delivering high-performing construction projects that leave project owners fully satisfied. This theory therefore supports management commitment in this study.

### **2.2.2 Resource-Based View Theory**

This theory focuses on the resources available to organizations and their impact on success. Barney (1991) aver that resources that are valuable, rare, inimitable, and non-substitutable are considered critical factors for organizations to establish and sustain a competitive edge. In the context of water projects, possessing unique and valuable resources can significantly enhance the likelihood of the project success and long-term sustainability. Valuable resources refer to those resources that enable organizations to create value and achieve their objectives. In the project context, valuable resources can include specialized knowledge, expertise, intellectual property, or access to critical funding sources. These resources contribute to the project's overall effectiveness and enhance its ability to deliver desired outcomes (Barney, 1991). Rare resources are resources that are not easily accessible or widely available to competitors.

Project teams that possess rare resources gain a competitive advantage by having access to unique capabilities or assets that set them apart from others. This uniqueness enables them to tackle challenges and exploit opportunities that others may not be able to replicate (Barney, 1991). Inimitable resources are those that are difficult for competitors

to imitate or replicate. These resources create a barrier to entry for potential rivals and provide a sustainable advantage for the project. For example, a project that has developed proprietary technology or has established strong relationships with key stakeholders may possess inimitable resources that enhance its sustainability (Barney, 1991).

Non-substitutable resources are resources that have no effective substitutes or alternatives. These resources are critical for the project's success, and their absence would significantly hinder the project's ability to achieve its objectives. Non-substitutable resources can include exclusive partnerships, unique infrastructure, or specific regulatory approvals that are essential for project viability (Barney, 1991). By leveraging resources that align with the characteristics of value, rarity, inimitability, and non-substitutability, projects can establish a competitive advantage that contributes to their success and sustainability. Identifying and strategically managing these resources is crucial for project teams to ensure a unique position in the market and to effectively address challenges and uncertainties that arise during project execution (Priem & Butler, 2001). This theory therefore supports resource allocation and project sustainability.

### **2.2.3 Technology Acceptance Model**

The Technology Acceptance Model (TAM) offers valuable insights into the factors that influence individuals' acceptance of new technologies. Postulated by Davis (1989), TAM highlights two critical factors that impact technology acceptance: perceived usefulness and perceived ease of use. These factors serve a pivotal role in determining the level of acceptance and adoption of new technologies, ultimately influencing the sustainability of projects that integrate these technologies. Perceived usefulness The degree to which people consider that a specific technology will improve their

performance or make their work better is known as usefulness work processes. When a project incorporates new technologies that are perceived as useful by its stakeholders, it increases the likelihood of acceptance and long-term sustainability (Davis, 1989). Users are more inclined to embrace technologies that offer clear benefits, such as increased efficiency, improved productivity, or enhanced outcomes.

Perceived ease of use, on the contrary, reflects individuals' perceptions of the ease with which they can learn and use a technology. Projects that prioritize user-friendly interfaces, intuitive functionalities, and provide adequate training and support are more likely to foster positive perceptions of ease of use (Davis, 1989). When stakeholders perceive a technology as easy to understand and operate, it reduces barriers to adoption and enhances the project's sustainability. The integration of new technologies into water projects requires careful consideration of their perceived usefulness and ease of use. By ensuring that technology implementation aligns with stakeholders' needs and provides clear benefits, projects can enhance the perceived usefulness and increase acceptance (Venkatesh & Davis, 2000). Additionally, addressing usability concerns and offering training and support mechanisms can improve stakeholders' perceptions of the ease of use, leading to greater acceptance and sustained use of the technology (Venkatesh & Davis, 2000). This theory therefore supports digital inclusion.

### **2.3 Empirical Review**

The research focuses on the empirical studies done both locally and internationally on the sustainability of water projects. This section highlights the various variables of management commitment, stakeholder participation, resource allocation and digital inclusion with respect to the sustainability of water projects.

### **2.3.1 Management Commitment and Sustainability of Water Projects**

Senbeta and Shu (2019) undertook a research study examining the management modalities during the implementation of community-managed water projects. The investigation centered on 102 water access points overseen by local communities, local governments, and NGOs, with a comparative analysis of the sustainability of each type of water project. The findings indicated that the modality of the water project significantly impacted its sustainability, particularly when contrasted with projects managed by local governments and NGOs. For ongoing benefits, it is essential that community-managed projects empower local members and involve them in decision-making regarding the construction of water access points. The research was conducted in Ethiopia, presenting a different context from that of Kenya, thereby highlighting contextual disparities. Additionally, the study did not address the management skills of the water committee members accountable for overseeing the water access points.

The commitment of top management was examined by Leksono, Siagian, and Oei (2020) in the context of operational success in Indonesia. The research employed a correlational design, gathering data from medium and large enterprises located in Java. A total of 55 participants contributed to the study. The findings indicated that a strong commitment from top managers enhances an organization's operational success. The success of the organization is directly influenced by the dedication of those in managerial positions. This suggests that sustained commitment from managers can lead to improved performance in various aspects. While the previous research adopted a correlational research method and was conducted in Indonesia, the current research adopts a descriptive approach and is being carried out in Kenya.

The research conducted by Karanja, Kahuthia, and Muraguri (2020) examined the impact of senior management commitment on the performance of schools owned by

churches. The study involved a census that included 192 participants, utilizing a descriptive research design. Data was gathered primarily through questionnaires, and both descriptive and inferential statistical methods were employed for analysis. The findings indicated that senior staff were granted greater authority and received enhanced training and incentives to boost their performance. While the previous study utilized a census approach focused on church-owned school performance, the current research adopted a stratified sampling technique due to the larger population and shifted its focus to the sustainability of water projects.

Sanusi and Johl (2021) investigated the influence of top management commitment on the implementation of project risk management. Their research employed a narrative methodology, which involved a inclusive literature review. This review aimed to underscore the essential factors that emerge from the strong commitment of senior managers. The findings were substantiated by data derived from previously published articles and studies. It was determined that effective communication and the automation of tasks are indicative of management commitment. Furthermore, it was noted that senior managers are responsible for organizing, leading, and supervising the activities necessary to achieve an organization's project goals. The previous study focused on project risk management and utilized a narrative methodology, while the current research adopted a descriptive approach with an emphasis on the sustainability of water projects.

Memon, *et al* (2022) explored the role of upper management commitment in enhancing environmental performance in Pakistan through an ex-post facto research design. A total of 222 key informants participated in the study, which concluded that environmental performance improves with strong commitment from top management. The findings indicated that when top managers prioritize employee training, having the

staff possessing the required knowledge and skills to fulfill their duties in the most efficient ways possible. While the previous study employed an ex-post facto design in Pakistan, the current research is conducted in Kenya utilizing a descriptive research approach.

### **2.3.2 Stakeholder Participation and Sustainability of Water Projects**

Masika (2020) investigated the sustainability of health projects in Uganda, focusing on stakeholder participation. The study explored various forms of participation, including passive, interactive, functional, and maximum involvement. A correlational research design was employed as the methodology, utilizing primary data. From the designated 255 participants, 153 were chosen employing simple random sampling to partake in the research. The data collected were analyzed using a combination of inferential and descriptive statistics. The findings indicated that the presence of interest groups was a sign of functional engagement. While the previous research adopted a correlational research method in Uganda, the current research adopts a descriptive approach and is conducted in Kenya.

The research carried out by Uwamariya, Safari, and Kengere (2021) explored the importance of stakeholder involvement in the sustainability of projects in Rwanda, specifically focusing on the Deaf Donor Funded Project in Kicukiro. Utilizing a descriptive methodology, the study purposefully sampled 152 participants from a target group of 246. A questionnaire was employed to obtain source data, and both descriptive and inferential statistics were utilized for analysis. The results demonstrated a substantial connection between stakeholder involvement and project sustainability. While this study was based in Rwanda and centered on donor-supported initiatives, the current research, conducted in Kenya, focuses on water projects.

Habumuremyi et al (2021) researched the effects of stakeholder participation on the sustainability of projects, specifically focusing on community-based initiatives in Rwanda. Their research adopted a descriptive design with a sample of 401 responders selected via convenience sampling. Both descriptive and inferential analyses were performed on the collected data. The outcomes revealed that both active and passive participation significantly influenced the sustainability of the initiatives. It was emphasized that involving all stakeholders in the decision-making process is a crucial aspect of effective stakeholder engagement. Consequently, the researchers strongly recommended that stakeholders be actively involved to ensure the sustainable implementation of initiatives. While their research utilized convenience sampling, the current research utilized a stratified sampling technique to encompass a broader segment of the population.

Nzomo and Gachengo (2021) researched Stakeholder participation and its impact on the sustainability of water projects in Machakos. The research was grounded in participatory theory, and a descriptive design was chosen. Participants included elders in the community, managers of the projects, and members of water committees. Using the purposive sample approach, community leaders were chosen to represent the project's beneficiaries. Both descriptive and inferential statistics were utilized to analyze the data. The investigation discovered that stakeholder participation directly and significantly affects the project's sustainability. The prior study used purposive sampling and was county-specific to Machakos. Stratified sampling was used in this study, which was conducted in Makueni County.

### **2.3.3 Resource Allocation and Sustainability of Water Projects**

Sadiq (2019) looked at how Kenyan water services boards performed in relation to their resource allocation approach. Descriptive and correlational designs were used in the

study. The research's intended audience was Kenyan Water Services Board workers. A sample size of 150 employees was chosen by the researcher utilizing the stratified random sampling technique from the pool of water services board employees. Feedback forms that were semi-structured were employed to obtain primary data. The research assistants in every area assisted with administering the questionnaires. Software called SPSS was used to evaluate the gathered data. There was use of both descriptive and inferential statistics. The research's results showed that the performance of water services boards was positively impacted by strategic personnel development, strategic financial resources, strategic infrastructure development, and strategic technological deployment. The previous study was focused on water service boards and utilized descriptive correlational research design. The recent study focused on water projects in Makueni County and utilized descriptive research design.

Impacts of resource allocation on the One Acre Fund Project's success in Rwanda's Karongi District were examined by Kwesiga and Mulyungi (2019). A descriptive research approach was employed. Questionnaires were the data gathering tools used in this investigation. Both descriptive and inferential statistics were employed to analyze the data. The statistical analysis for the study was developed by the researcher using the SPSS ver. 23, which also enabled data summarization. The study found a significant favourable link between the distribution of seeds and higher maize yield. The study came to the conclusion that increasing maize yield and fertilizer allocations are significantly correlated. The prior research was conducted on an agricultural project in Rwanda. The current investigation was done in Kenya and focused on water projects

Impacts of resource allocation on the performance of residential construction projects in Nairobi City County, Kenya, were examined by Ronoh and Kirui (2020). Utilizing a descriptive survey study approach, simple random sampling and purposive sampling

were applied. The target population for each of the 79 gated community residential development projects that were chosen included the contractors, project managers, and supervisors. Feedback forms were employed in the gather of data. The data displayed in the tables were analyzed using both descriptive and inferential statistics. The study discovered a strong correlation between project performance and resource scheduling. The prior study concentrated on Nairobi County and used simple and purposeful sampling technique. Stratified sampling was used in this study, which was conducted in Makueni County.

Waitutu (2022) investigated how resource allocation affected the M&E system performance of child protection projects. A descriptive design was used with 9 child protection programs serving as the analysis unit and 220 World Vision Kenya employees at the organization's Nairobi headquarters serving as the observation unit. Purposive sampling yielded a sample size of 141 people. Ten Save-the-Children respondents participated in a pilot study where a feedback form was employed to obtain source data. The SPSS application was utilized to process the gathered data, with the help of inferential statistics (regression analysis) and descriptive frequencies and percentages. The performance of the M&E system of the child protection initiatives was shown to be highly influenced by the allocation of resources. The previous study focused on child protection projects and utilized purposive sampling method. The present research concentrated on water projects and utilized stratified sampling method.

#### **2.3.4 Digital Inclusion and Sustainability of Water Projects**

Feise *et al* (2019) conducted research on digital inclusion and its effects on project team management in Sweden. The study's focus was on medium-sized technology-related businesses. The research employed a systematic review approach. After the analysis, a framework describing digitalization and its impact on innovation was developed.

Research showed that digitization fostered and improved remote teams, leading to increased cooperation and dialogue. However, the aforementioned study was conducted in Sweden with a focus on medium-sized technology companies. As a result, the current research was done in Kenya with an emphasis on projects involving water.

A study on digital inclusion and its effects on project management procedures in Poland was conducted by Kozarkiewicz (2020). In summary, the investigation was an empirical study, and the participants were project managers. Research indicates that the use of digital transformation has yielded notable and favorable improvements in project management procedures. The conclusions on the impact's multidimensionality were derived from empirical research involving approximately one hundred project managers, as well as an analysis of how they saw the key elements of digital inclusion. The earlier research, which was conducted in Poland, used an empirical methodology. This study, which was conducted in Kenya, employed a descriptive methodology.

Alhassan and Adam (2021) examined how technology access and digital inclusion affect people's quality of life. The technique for the study was a systematic review methodology. The information included in the paper came from secondary sources and was collected in 121 different countries in 2018. The study was decided to use the structural equation model as an analytical technique to provide findings. Research has shown that increased access to technology and digital inclusion improve people's quality of life on a worldwide scale. The earlier study used secondary data and a systematic review methodology. The current research utilized primary data and a descriptive methodology.

The study conducted by Marnewick & Marnewick (2022) researched the impact of digitalization on project management in Africa. The research, which used desk research methodology, found that projects are increasingly being forced to adopt new

technologies that change the way that activities and operations are executed due to the rapid progression of digital technology and the substantial volume of data they may manage. It was found that in order to improve operations, the majority of project managers have turned to adopting agile methodologies. The prior study concentrated on African nations and used desk research methodology. The current research was done in Kenya utilizing a descriptive methodology.

## **2.4 Summary of Literature Review and Research Gaps**

### **Table 2.1: Summary of Literature Review**

<b>Author (s)</b>	<b>Objectives</b>	<b>Major Findings</b>	<b>Research Gaps</b>	<b>Current study</b>
Ronoh and Kirui (2020)	Analyzed the effects of resource distributions to the negotiations of residential construction projects in Nairobi City County, Kenya	The research demonstrated a strong connection between project performance and resource scheduling	The prior study concentrated on Nairobi County and used simple and purposeful sampling technique	Stratified sampling was used in this study, which was done in Makueni County
Karanja, Kahuthia, and Muraguri (2020)	The issue of concern included senior management commitment and its impact on the success of churches-owned schools	According to the report, senior employees were given more authority and were given better training and incentives to improve their performance	The prior study used a census method and was based on church-owned school performance	The current study applied the stratified sample technique and concentrate on the sustainability of water projects
Habumuremyi et al (2021)	The posited effects of stakeholder involvement on the sustainability of the project	It was discovered that there was both active and passive engagement, which had an immediate effect on the initiatives' potential to persist	The earlier research, which was carried out in Rwanda, used the convenience sampling approach	Kenya was the location of the current research and utilized stratified sampling technique
Nzomo and Gachengo (2021)	Examined the level of participation of stakeholders and the influence it can have in terms of the sustainability of the water projects in Machakos	The investigation revealed that stakeholder participation directly and significantly affects the project's sustainability	The prior study used purposive sampling and was county-specific to Machakos	Stratified sampling was used in this study, which was conducted in Makueni County
Alhassan and Adam (2021)	Examined how technology	Research has shown that	The earlier study used	The current study made

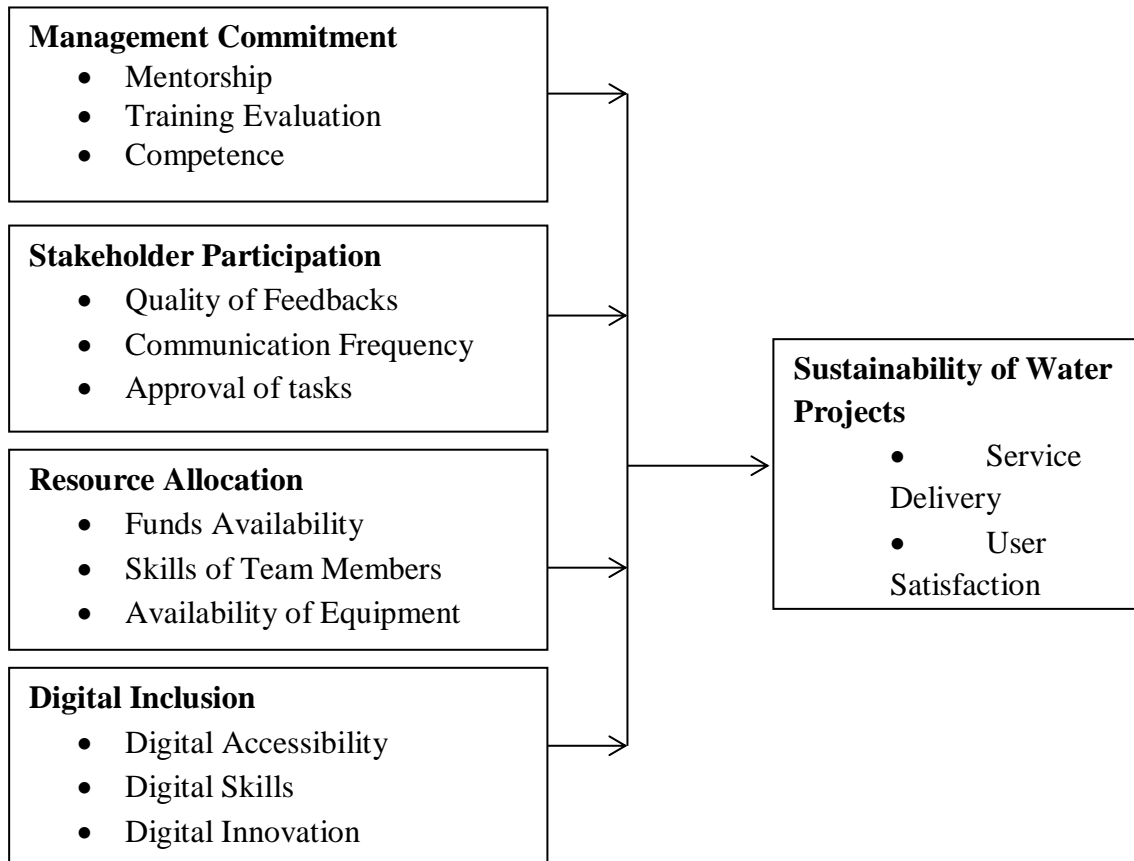
	access and digital inclusion affect people's quality of life	increased access to technology and digital inclusion improve people's quality of life on a worldwide scale	secondary data and a systematic review methodology	use of primary data and a descriptive methodology
Memon, et al (2022)	Researched the commitment of upper management and its significance for environmental performance in Pakistan	The study found that top managers' dedication to employee training equips staff members with strong skills and knowledge so they can carry out their tasks efficiently	The earlier study used an ex post facto research design and was conducted in Pakistan	The current investigation took place in Kenya and make use of descriptive research design
Waitutu (2022)	Investigated how resource allocation affected the M&E system performance of child protection projects	The performance of the M&E system of the child protection initiatives was shown to be highly influenced by the allocation of resources	The previous study focused on child protection projects and utilized purposive sampling method	The present research focused on water projects and employed stratified sampling method
Marnewick & Marnewick (2022)	Examined the impact of digitalization on project management in Africa	It was found that in order to improve operations, the majority of project managers have turned to adopting agile methodologies	The prior study concentrated on African nations and used desk research methodology	The current research was done in Kenya using a descriptive methodology

**Source: Researcher (2024)**

## 2.5 Conceptual Framework

The graphic below illustrates the link between the research variables.

### Independent Variables



**Figure 2.1: Conceptual Framework**  
Researcher (2024)

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter outlines the research design and procedure that shall be employed in the research. It discusses the chosen research design, the intended populace, sampling techniques and sample size, data gathering instruments, data analysis procedures, and data management and ethical deliberations.

#### **3.2 Research Design**

The research design utilized in this research was a descriptive research study. With reference to Coopers and Schindler (2003), descriptive design explains the characteristics of a population or examines relationships between variables. Descriptive research method was employed in this specific research to establish a connection between project management and sustainability of the water projects that had been funded by the County Government of Makueni, Kenya.

#### **3.3 Target Population**

Kothari (2004) posit that target population where by number of such objects, individuals or any other object of interest might be found that due to having a certain item in common, could result in gathering of the corresponding information on given phenomenon being analyzed and is of interest to the researcher. This research had a target population of 100 respondents drawn on forty-three (43) completed water projects.

### 3.4 Sampling Techniques and Sample Size

Sampling technique is a specific methodology employed to choose representative portion of the entire target populace (Eden & Nielsen, 2020). Stratified sampling was used by the researcher since the research was undertaken to identify the project management aspects of water projects. The study's convenience and the need to obtain information for the research led to the selection of this sampling. A stratum comprising of project beneficiaries, sustainability committee members, community members, local leaders and county government officials engaged in county government-funded water projects in Makueni County, Kenya served as respondents of the study. The approximate sample size for this study is 85 drawn from a total sample of 100 individuals. A 5% margin of error and a confidence level of 95% shall be maintained.

**Table 3.1: Sample Size**

<b>Category</b>	<b>Population</b>	<b>Sample Size</b>	<b>Percentage</b>
Project Beneficiaries	15	13	15.3
Sustainability Committee Members	18	15	17.6
Community Members	29	25	29.4
Local Leaders	19	15	17.6
County Government Officials	20	17	20
	<b>100</b>	<b>85</b>	<b>100</b>

### 3.5 Data Collection Instruments

This research utilized a self-administered questionnaire that was semi-structured to collect the primary information. ThaneM and Knights (2019) assert that questionnaires facilitate the acquisition of an enormous amount of data in a brief period. The utilization of questionnaires as effective instruments for data collecting renders the process less laborious due to their ease of administration and analysis (Fellows & Liu, 2021). Questionnaires shall be administered through drop and pick later method. The positions of two research assistants will be announced and two research assistants will be trained to assist in the administration of questionnaires to the respondents to be administered.

### **3.6 Pilot Test**

Pilot testing refers to the preliminary phase of a study where a small version of the research process is conducted to identify and rectify potential issues or flaws prior to the full-scale study is implemented. A pilot test was done with a small sample from the intended audience to assess instruments' effectiveness. The pilot test aided in identifying any issues with the instruments and enable necessary revisions. Nine (9) project beneficiaries from five (5) different projects were utilized as the pilot test as 10% of the population sampled not utilized for the study was utilized.

#### **3.6.1 Validity of Instruments**

Validity is the level to which a research instrument gauges an item that it is intended to (Ghauri, et al, 2020). Through the interaction of a supervisor and two specialists in the sphere of the project planning and management, the content validity and construct validity of the questionnaires were tested. Content validity determines the extent to which the tools gauge the intended concepts, while construct validity evaluates the level to which the instruments measure the underlying constructs of interest. Suggestions raised shall be used to enhance the proposed questionnaires before presenting them to the respondents.

#### **3.6.2 Reliability of Instruments**

The ease of use, consistency and accuracy of the data study tool in its measurement of an underlying issue is the measure of its reliability (Rose, McKinley & Baffoe-Djan, 2019). Data obtained from the research was analyzed using quantitative as well as qualitative techniques using SPSS version 21. The data will be corrected, coded and will be analyzed in a descriptive manner through the use of the SPSS and reported in tabulated form and figures. Multiple regression model was used to determine relative importance of all variables relative to Sustainability of water projects financed by the

county government of Makueni. Multiple regression technique is a technique of data analysis that is quite flexible. Whenever one is to measure each time dependent or quantitative study variable in relation to any other factor (predator or independent variable). The reliability tests results are displayed in Table 3.2.

**Table 3.2: Results of Reliability Tests**

<b>Variable</b>	<b>Chronbach Alpha value</b>	<b>Remarks</b>
Management commitment	0.752	Reliable
Stakeholder participation	0.712	Reliable
Resource allocation	0.756	Reliable
Digital inclusion	0.785	Reliable
Project sustainability	0.706	Reliable
<b>Aggregate Score</b>	<b>0.742</b>	<b>Reliable</b>

**Source: Pilot Study (2024)**

Table 3.2 demonstrates that all the variables had achieved a Chronbach alpha values >0.7 with an aggregate score of 0.742. Consequently, it was determined that the questionnaire items exhibited reliability.

### **3.7 Data Collection Procedure**

The researcher first got the required approvals and permits from NACOSTI and the graduate school before beginning the data gathering process. Subsequently, the researcher commenced obtaining data by having the participants complete a questionnaire. The researcher verified that all surveys were distributed and that the technique used to gather the data complies with ethical guidelines pertaining to confidentiality, tolerance, and respect. However, distribution and questionnaire collection employed the drop-and-pick method.

### 3.8 Data Analysis and Presentation

The data collected from the survey and interviews underwent analysis utilizing descriptive statistics, relational statistics, and inferential statistics. To make sense and gain meaningful insights of the collected data, processing of the raw information through data analysis is done (McKinley & Rose, 2019). Descriptive statistics were employed to summarize the quantitative data and provide an overview of sample demographics. Relational statistics described connections between variables, while inferential statistics were utilized to test hypotheses. The data was displayed through tables, graphs, and charts to facilitate comprehension and analysis.

In the study, the Cronbach's Alpha regression model shall be applied as follows:

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

Whereby:

Y = Sustainability of Water Projects

$\beta_0$  = Constant Term

$X_1$  = Management Commitment

$X_2$  = Stakeholder Participation

$X_3$  = Resource Allocation

$X_4$  = Digital Inclusion

**The  $\beta_1 - 4$  are change or regression co-efficient and  $\varepsilon$  is a random error term that is attributed to study variables that affect sustainability of water project.**

### 3.9 Ethical Considerations

The data obtained during this research was stored in a secure location, accessible only to the team involved. To ensure the ethical conduct of the study, permission to carry out the research will be obtained from the Graduate School of Kenyatta University. A research permit also was obtained from NACOSTI before the commencement of data

collection. Informed consent will be obtained from all individuals before their participation in the study. Measures were implemented to maintain the confidentiality of collected data, ensuring that participants' identities remain protected. Additionally, steps were taken to protect participants from any harm that could arise during the study, prioritizing their well-being and safety.

## CHAPTER FOUR

### RESEARCH FINDINGS AND DISCUSSIONS

#### 4.1 Introduction

This chapter provides an examination of data obtained. The first thing provided is the response rate, then information about the background of the descriptive statistics, the results of inferential statistics and respondents.

#### 4.2 Response Rate

The research's objective was to gather information from 85 respondents selected from 5 categories which included; project beneficiaries, sustainability committee members, community members, local leaders and county government officials. Nevertheless, the research did not get a 100% response rate due to occurrences of non-response, as illustrated in Table 4.1.

**Table 4.1: Response Rate**

<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
Response	80	94.1
Non response	5	5.9
<b>Total</b>	<b>85</b>	<b>100</b>

#### **Research Data (2024)**

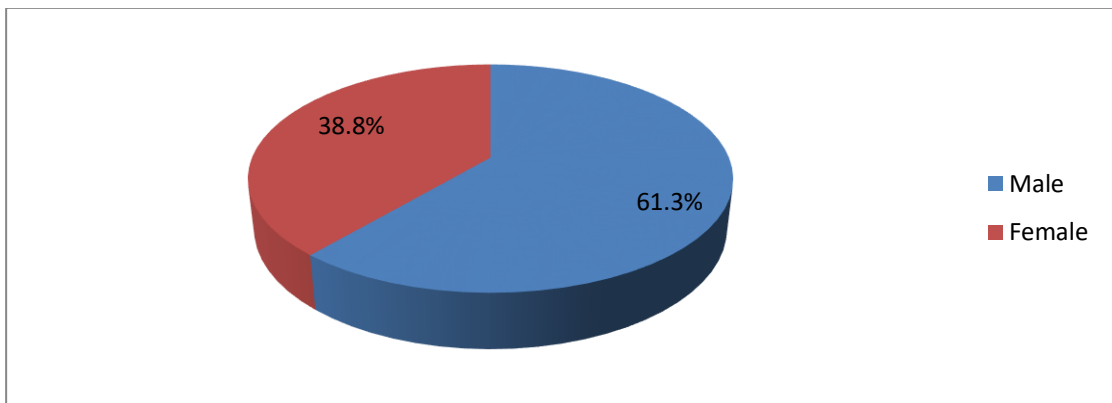
The findings reveal that, of the 85 participants, 80 completed and resubmitted their questionnaires, yielding a response rate of 94.1%. This rate meets the criteria for deriving conclusions and formulating generalizations from the sample, as advised by Mugenda and Mugenda (2003).

### 4.3 Demographic Data of the Respondents

The respondents' demographic characteristics was analysed focusing on their gender, age bracket, highest academic attainment, project role and type of water project available within the locality. The results are delineated as follows;

#### 4.3.1 Gender

The gender representation results of the participants in the research are shown in Figure 4.1.



**Figure 4.1: Gender Research Data (2024)**

The findings shown in Figure 4.1 reveal that male responders comprised the majority at 61.3%, whilst female responders made up 38.8%. This demonstrates a balanced representation of both genders in the study. Such diversity is essential, as it allows the research to more effectively address the unique challenges and opportunities encountered by different genders in the realm of water project management.

#### 4.3.2 Age Bracket

The age range distribution of the responders in the research is outlined in Table 4.2.

**Table 4.2: Age Bracket**

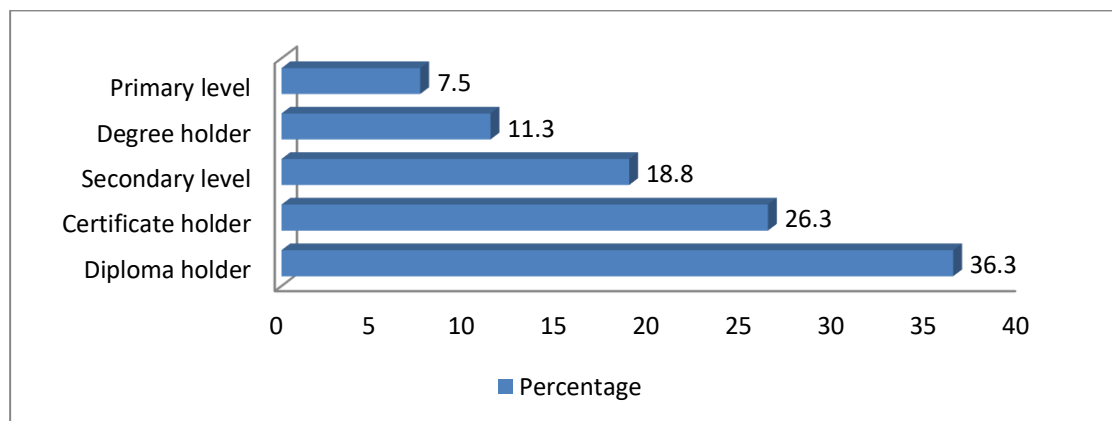
Age Bracket	Frequency	Percentage
20 – 30 years	12	15.0
30 – 40 years	27	33.8
40 -50 years	30	37.5
50+ years	11	13.8
<b>Total</b>	<b>80</b>	<b>100</b>

**Source: Research Data (2024)**

Table 4.2 reveals that the largest segment of participants (37.5%) was in the 40-50 age bracket, followed by 33.8% aged 30-39, 15.0% between 18-27, and 13.8% aged 50 and above. This diversity in age indicates that the research encompassed workers from a variety of age groups. According to Gordon (2018), younger project managers often have different priorities and approaches compared to their older counterparts. By acknowledging and addressing these disparities, project teams can improve their teamwork and work more efficiently towards common goals.

### 4.3.3 Highest Academic Qualification

The results on highest academic qualification representation of the participants in the research are shown in Figure 4.2.



**Figure 4.2: Highest Educational Qualification**

**Research Data (2024)**

The study revealed that most participants (36.3%) held a diploma, followed by 26.3% with a certificate, 18.8% at the secondary level, 11.3% who were degree holders, and

7.5% with a primary education. This infers that a substantial portion of the responders possessed a higher level of education. Ilmakunnas and Ilmakunna (2021) emphasize that diverse representation is crucial for ensuring research is culturally sensitive and relevant to the local context. By incorporating respondents with varying educational backgrounds, including those from the local community, the study can more effectively address the unique challenges and opportunities in Makueni County.

#### **4.3.4 Role in the Project**

The results on the title the respondents held in the research are displayed in Table 4.3.

**Table 4.3: Role in the Project**

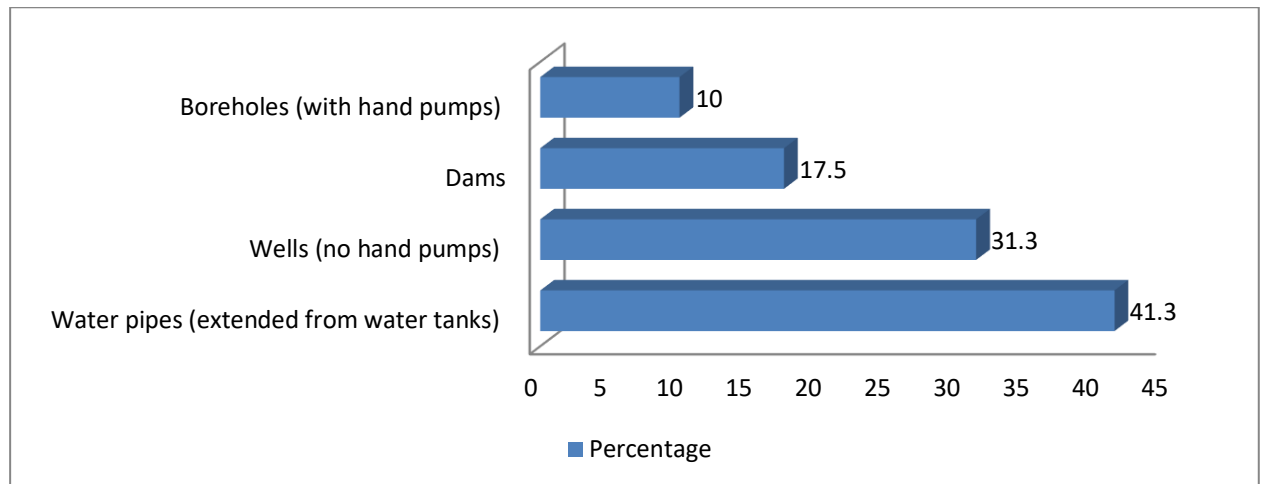
<b>Role</b>	<b>Frequency</b>	<b>Percentage</b>
Project Manager	12	15.0
Committee member	15	18.8
Community leader	23	28.8
Project beneficiary	15	18.8
<b>Total</b>	<b>80</b>	<b>100</b>

#### **Research Data (2024)**

The results presented in Table 4.3 suggests that most (28.8%) of the responders were community leaders, followed by 18.8% being committee members and project beneficiaries respectively and 15.0% project managers. This shows that that project was being implemented by various stakeholders. Bennett (2019) observe that a diverse representation ensures that different perspectives and experiences are taken into account during the research process. Therefore, the study could gain a more comprehensive understanding of the challenges and opportunities faced in implementing water projects in the region.

#### 4.3.4 Type of Water Project within the Locality

The results on the type of water project within the locality of the respondents in the research are shown in Figure 4.3.



**Figure 4.3: Type of Water Project within the Locality**

#### Research Data (2024)

Figure 4.3 indicate that most (41.3%) of the projects within the locality were water pipes (extended from water tanks), followed by wells (no hand pumps) at 31.3%, 17.3% representing dams and 10.0% represented boreholes (with hand pumps). This shows that the locality had a good number of various water projects.

#### 4.4 Descriptive Statistics Results

The research employed descriptive analysis on the quantitative data, presenting the Mean (M) and Standard Deviation (SD) for each questionnaire item based on the particular variable. The findings are displayed in the following manner.

##### 4.4.1 Management Commitment

The research sought to assess the effect of management commitment and the sustainability of water projects funded by the county government of Makueni, Kenya.

The descriptive statistics results are presented in Table 4.4.

**Table 4.4: Management Commitment**

<b>Statements</b>	<b>M</b>	<b>SD</b>
The management team is chosen because of their technical skill in running water projects	4.59	0.41
The management team has long experience in project management	3.95	1.05
Committee members are picked based on their know-how on running water projects	3.57	1.43
The water committee members must have resource handling skills to serve the locals	3.99	1.01
The project committee members undertake to coordinate challenges with multiple stakeholders	3.97	1.03
Continuous trainings improve the skills of the project committee members	4.67	0.33
Arranged learning exchange visits improve project management skills of the Committee members	4.53	0.47
Project committee membership with diverse skills leads to high cases of project sustenance	3.90	1.10
<b>Aggregate Mean and Standard Deviation Score</b>	<b>4.15</b>	<b>0.854</b>

**Research Data (2024)**

The result presented in Table 4.4 demonstrates that the study recorded an overall mean score of 4.15 and a variation of 0.854. This indicates that responders concurred that management commitment plays a significant role in the sustainability of water projects funded by the county government of Makueni, Kenya. These findings are congruent with the research by Senbeta and Shu (2019), which examined management strategies during project implementation and the sustainability of community-managed water projects. Their research suggested that the management approach of water projects had a greater impact on sustainability compared to projects managed by local governments and NGOs.

The respondents expressed strong agreement with the following statements: Continuous training enhances the skills of project committee members (M=4.67, SD=0.33), the management team is selected based on their technical expertise in managing water projects (M=4.59, SD=0.41), and organized learning exchange visits enhance the project management skills of committee members (M=4.53, SD=0.47). These findings align with the research conducted by Leksono, Siagian, and Oei (2020),

which highlighted the importance of top management commitment for operational success in Indonesia. The analysis indicated that highly dedicated top managers significantly contribute to an organization's operational effectiveness, with performance being directly influenced by the commitment of those in managerial positions.

The statements agreed by the respondents were; the water committee members must have resource handling skills to serve the locals (M=3.99, SD=1.01), The project committee members undertake to coordinate challenges with multiple stakeholders (M=3.97, SD=1.03), the management team has long experience in project management (M=3.95, SD=1.05), Project committee membership with diverse skills leads to high cases of project sustenance (M=3.90, SD=1.10) and committee members are picked based on their know-how on running water projects (M=3.57, SD=1.43). The results are congruent with Memon, Rasli, Dahri, and Hermilinda-Abas (2022) who researched the commitment of upper management and its significance for environmental performance in Pakistan. The study found that top managers' dedication to employee training equips staff members with strong skills and knowledge so they can carry out their tasks efficiently.

#### **4.4.2 Stakeholder Participation**

The research aimed at evaluating the role of stakeholder engagement and water project sustainability by the county government of Makueni in Kenya. Table 4.5 gives the results of the descriptive statistics.

**Table 4.5: Stakeholder Participation**

<b>Statements</b>	<b>M</b>	<b>SD</b>
In the decision making particularly on the water projects, all stakeholders are involved	4.45	0.54
The local community members have been trained on doing minor repair works of the water project	4.05	0.95
The leaders of the project share the information with the local community regarding every phase of the water project	4.44	0.56
It is the local community where skilled/unskilled labor force was hired in the water project.	4.63	0.37
There are other stakeholders that keep an eye on the undertaking to make sure that it serves the communities	4.66	0.34
These are water projects whose cost is shared by various parties (donors, national and county government)	4.55	0.45
The success of water project is encouraged to receive contributions of various stakeholders	3.23	1.77
The project is entrusted in the local shave in order to continue in the project in the long run.	3.22	1.78
The stakeholders have played significant roles in ensuring that the water projects go on.	4.19	0.81
<b>Aggregate Mean and Standard Deviation Score</b>	<b>4.16</b>	<b>0.841</b>

**Research Data (2024)**

The result presented in Table 4.5 demonstrates that the study obtained an overall mean score of 4.16 and a variation of 0.841. This indicates that responders generally concurred that stakeholder participation influences the sustainability of water projects funded by the county government of Makueni, Kenya, as measured on a 5-point Likert scale. This finding aligns with Masika (2020), who explored the sustainability of health projects in Uganda and the role of stakeholder participation. The research highlighted that the presence of interest groups was a sign of effective engagement.

The statements strongly agreed by the respondents were; all stakeholders monitor the project to ensure it continues to serve the communities (M=4.66, SD=0.34), the water project hired skilled/unskilled staff from the local community (M=4.63. SD=0.37), the cost of the water projects is cost-shared by different stakeholders (donors, national and county government) (M=4.55, SD=0.45). The findings are congruent with those of the research by Uwamariya, Safari, and Kengere (2021) which examined the significance

of stakeholder participation in relation to the project's sustainability in Rwanda and suggested that there is a strong connection between the involvement of stakeholders and the project's sustainability.

The statements agreed by the respondents were; All stakeholders are included in making decisions concerning the water projects (M=4.45, SD=0.54), the project leaders communicate to the local community on each stage of the water project (M=4.44, SD=0.56), Stakeholders have significantly facilitated the sustainability of the water projects (M=4.19, SD=0.81), the local community members are trained to undertake minor repairs on the water project (M=4.05, SD=0.95). The findings correspond with those of a research by Habumuremyi *et al* (2021) about the effects of stakeholder participation on project sustainability and discovered that there was both active and passive engagement, which had an immediate effect on the initiatives' potential to persist.

The statements that that the respondents indicated neutral were; Contributions from all stakeholders are encouraged for the success of the water project (M=3.23, SD=1.77 and that local shave the obligation of maintaining the project for sustaining it (M=3.22, SD=1.78). The finding contradicts the research by Nzomo *et al* (2021) regarding stakeholder participation and its effect on the sustainability of water projects in Machakos and revealed that stakeholder participation directly and significantly affects the project's sustainability.

#### **4.4.3 Resource Allocation**

The research aimed to ascertain the influence resource allocation and the sustainability of water projects funded by the county government of Makueni, Kenya. The descriptive statistics results are presented in Table 4.6.

**Table 4.6: Resource Allocation**

<b>Statements</b>	<b>M</b>	<b>SD</b>
There is donor support for the water projects in our locality	3.61	1.39
Sometimes, the stakeholders participate in raising funds for the water project	3.96	1.04
The water project costs are handled by international donors and the county government	3.57	1.43
The local community members contribute to the project by providing locally available materials	4.51	0.49
There are adequate funds for water project for maintenance services	4.60	0.40
The budgeted cost for the water project is partly paid by the constituency Development (CDF) funds	4.19	0.81
Funds for water project maintenance is disbursed on a timely basis	4.07	0.93
The water project budget goes through monitoring and evaluation process to reduce unnecessary expenses	4.11	0.89
The cash realized from the project is adequate to sustain the project	3.64	1.36
<b>Aggregate Mean and Standard Deviation Score</b>	<b>4.03</b>	<b>0.971</b>

**Research Data (2024)**

Table 4.6 demonstrates that the study achieved an aggregate mean and deviation score of 4.03 and 0.971 respectively which means that the responders agreed that resource allocation affects the sustainability of water projects funded by the county government of Makueni, Kenya. The finding is consistent with Sadiq (2019) study which looked at how Kenyan water services boards performed in relation to their resource allocation approach. The results of the research implied that the success of water services boards was positively impacted by strategic personnel development, strategic financial resources, strategic infrastructure development, and strategic technological deployment.

The responders strongly agreed on the following claims; There are adequate funds for water project for maintenance services (M=4.60, SD=0.40) and the local community members contribute to the project by providing locally available materials (M=4.51, SD=0.49). The finding corresponds to the research by Kwesiga and Mulyungi (2019) regarding the effects of resource distribution on the success of the One Acre Fund Project in Rwanda's Karongi District and the study found a significant favourable link between the distribution of seeds and higher maize yield.

The responders concurred on the following claims; The budgeted cost for the water project is partly paid by the constituency Development (CDF) funds (M=4.19, SD=0.81), The water project budget goes through monitoring and evaluation process to reduce unnecessary expenses (M=4.11, SD=0.89), Funds for water project maintenance is disbursed on a timely basis (M=4.07, SD=0.93), sometimes, the stakeholders participate in raising funds for the water project (M=3.91, SD=1.04), The cash realized from the project is adequate to sustain the project (M=3.64, SD=1.36) there is donor support for the water projects in our locality (M=3.61, SD=1.39), the water project costs are handled by international donors and the County government (M=3.57, SD=1.43). The finding agrees with research on impacts of resource allocation about residential construction project success in Kenya, Nairobi City County examined by Ronoh and Kirui (2020). The study discovered a strong correlation between project performance and resource scheduling.

#### **4.4.4 Digital Inclusion**

The study tried to determine the relevancy of the digital inclusion and the sustainability of the projects in water that are being given county government of Makueni in Kenya. The outcomes of the descriptive statistics can be noticed in Table 4.7.

**Table 4.7: Digital Inclusion**

<b>Statements</b>	<b>M</b>	<b>SD</b>
Selecting appropriate technology has become a primary concern of our Project committee members	4.34	0.66
The water projects employ the use of innovative technologies that result in long lasting projects	3.09	1.91
The project uses digital pumping technology	4.47	0.53
ICT systems are used for communication purposes in the water projects	3.91	1.09
Use of modern technologies leads to accountability of resources for the water project	4.58	0.42
The information from the project is cannot be accessed without following a pre-defined channel.	4.57	0.43
The choice of modern technology enables the managers to provide high quality of water to the locals	4.53	0.47
The IT skills of staff determines which technologies to be used in the water project	4.59	0.49
Data from the project is continually stored	3.67	1.33
Use of modern technologies increases sustainability measures of the water projects	4.11	0.89
The project managers use available pumping technologies based on solar energy to sustain the operations of the project	3.52	1.48
The water project sustainability relies on adopted technology effectiveness	4.23	0.77
<b>Aggregate Mean and Standard Deviation Score</b>	<b>4.13</b>	<b>0.873</b>

**Research Data (2024)**

The findings of the research as shown on Table 4.7 show there was a cumulative mean score of 4.13 and variation score of 0.873 implying that the study responders affirmed that digital inclusion has impact on the sustainability of the county government of Makueni, Kenya funded water projects. The findings are congruent with Feise *et al* (2019) who conducted research on digital inclusion and its effects on project team management in Sweden. The research showed that digitization fostered and improved remote teams, leading to increased cooperation and dialogue.

The responders were highly in concurrent under the claims that; The IT skills of staff determines which technologies to be used in the water project (M=4.59, SD=0.49), use of modern technologies leads to accountability of resources for the water project (M=4.58, SD=0.42), The information from the project is cannot be accessed without

following a pre-defined channel (M=4.57, SD=0.43), The choice of modern technology enables the managers to provide high quality of water to the locals (M=4.53, SD=0.47). The findings are congruent with a research on digital inclusion and its effects on project management procedures in Poland which was conducted by Kozarkiewicz (2020). Research indicates that the use of digital transformation has yielded notable and favorable improvements in project management procedures.

The responders agreed on the claims that; The project uses digital pumping technology (M=4.47, SD=0.53), selecting appropriate technology has become a primary concern of their project committee members (M=4.34, SD=0.66), The water project sustainability relies on adopted technology effectiveness (M=4.23, SD=0.77), use of modern technologies increases sustainability measures of the water projects (M=4.11, SD=0.89), ICT systems are used for communication purposes in the water projects (M=3.91, SD=1.09), Data from the project is continually stored (M=3.67, SD=1.33), The project managers use available pumping technologies based on solar energy to sustain the operations of the project (M=3.52, SD=1.48), the water projects employ the use of innovative technologies that result in long lasting projects (M=3.09, SD=1.91). The finding concurs with Alhassan and Adam (2021) who examined how technology access and digital inclusion affect people's quality of life. Research has shown that increased access to technology and digital inclusion improve people's quality of life on a worldwide scale.

#### 4.4.5 Sustainability of Water Projects

The research paper intended at ascertaining the sustainability of the projects that were being funded by county government of Makueni in Kenya concerning water. Table 4.8 indicates the outcomes of the descriptive statistics.

**Table 4.8: Sustainability of Water projects**

<b>Statements</b>	<b>M</b>	<b>SD</b>
The water project has water flow all the time to be used by the locals	3.34	1.66
The project can supply water to the locals on all-year basis	2.85	2.14
The maintenance of the water projects turns them to be long lasting	2.22	1.78
The upgrading of the water projects enhances the sustainability of the projects	2.90	2.10
Surveillance and evaluation of the project will make the project functional	3.09	1.81
Endurance of the water project is longer when the quality standards of the projects are upheld	2.75	2.25
<b>Aggregate Mean and Standard Deviation Score</b>	<b>2.86</b>	<b>1.957</b>

**Research Data (2024)**

Table 4.8 demonstrates that the study achieved an cumulative mean and deviation score of 2.86 and 1.957 respectively which means that the respondents indicated neutral on statements describing the sustainability of water projects funded by the county government of Makueni, Kenya. The conclusion contradicts Abrams (2018), who observes that sustainability entails the ongoing continuation of a project to maintain the same benefits for project owners and recipients. It aims to deliver the same functionality as outlined in the initial plans at the project's inception, while maintaining or improving product quality.

The respondents indicated neutral of the statements that; the water project will constantly flow water which can be used by the local people (M=3.34, SD=1.66), Monitoring and evaluation of the project will keep the project running (M=3.09, SD=1.81), upgrading of the water projects improves their sustainability (M=2.90, SD=2.10), Locals can access water from the project all year-round (M=2.85, SD=2.14),

In any case when quality standards at the projects are taken care of then the water projects are long lasting ( $M=2.75$ ,  $SD=2.25$ ) and maintenance of the water projects make them last longer ( $M=2.22$ ,  $SD=1.78$ ). The finding contradicts with Nakagami, Kubota & Setiawan (2016), research which observe that factors such as sufficient funds to cover upkeep and maintenance costs, will offer well-qualified and competent service providers capable of designing and executing good water projects, as well as people's well-being and growth, are required for project sustainability.

#### **4.5 Inferential Statistics Results**

It did form an inferential analysis in which the correlation analysis and the regression analysis were performed to find out the influence of one variable on another. The results were obtained as follows:

##### **4.5.1 Correlation Analysis**

The research employed Pearson's correlation coefficient ( $r$ ) to examine both the existing connection between variables and to detect significant correlations among the variables under investigation (Cooper & Schindler, 2014). The conclusions are displayed in Table 4.9.

**Table 4.9: Correlation Analysis**

		<b>Management Commitment</b>	<b>Stakeholder Participation</b>	<b>Resource Allocation</b>	<b>Digital Inclusion</b>	<b>Project Sustainability</b>
Management commitment	Pearson	1				
	Correlation					
	Sig. (2-tailed)					
	N	80				
Stakeholder participation	Pearson	.101*	1			
	Correlation					
	Sig. (2-tailed)	.015				
	N	80	80			
Resource allocation	Pearson	.058*	.086	1		
	Correlation					
	Sig. (2-tailed)	.0211	.136			
	N	80	80	80		
Digital inclusion	Pearson	0.221	.381	.374	1	
	Correlation					
	Sig. (2-tailed)	.261	.112	.191		
	N	80	80	80	80	
Project sustainability	Pearson	.804*	.736	.776	.799	1
	Correlation					
	Sig. (2-tailed)	.001	.003	.002	.003	
	N	80	80	80	80	80

\*. Correlation is significant at the 0.05 level (2-tailed).

Table 4.9 illustrates the relationships between the variables under investigation. There is a favourable connection between project sustainability and several factors: management commitment ( $r = 0.804$ ,  $p = 0.001$ ), stakeholder participation ( $r = 0.736$ ,  $p = 0.003$ ), resource allocation ( $r = 0.776$ ,  $p = 0.002$ ), and digital inclusion ( $r = 0.799$ ,  $p = 0.003$ ). These results indicate that strengthening project management skills may enhance the sustainability of water projects in Makueni County, Kenya.

#### 4.5.2 Regression Analysis

Regression analysis was utilized to establish the impact amongst variables. The results are summarized in Tables 4.10, 4.11, and 4.12.

**Table 4.10: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.888 <sup>a</sup>	.789	.754	1.010

#### Research Data (2024)

The adjusted R value in Table 4.10 indicates a correlation coefficient of 0.754, which implies a robust connection between the independent variables—management commitment, stakeholder participation, resource allocation, and digital inclusions—and the sustainability of water projects in Makueni County, Kenya. This finding suggests that these independent variables account for approximately 75.4% of the variability in the sustainability of water projects, with the remaining 24.6% ascribed to factors excluded from the model.

**Table 4.11: Analysis of Analysis**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	101.210	4	25.3025	31.548	.003
	Residual	60.152	75	0.802		
	Total	161.362	79			

#### Research Data (2024)

The significance value in Table 4.11 is 0.003, falling below 0.05. Table 4.11 also demonstrates that the ANOVA statistic,  $F_{cal}(4, 80) = 31.548$ ,  $p < 0.05$ , suggesting that the regression model was statistically significant, surpassing  $F_{tab}(4, 80) = 25.3025$ ,  $p < 0.05$ ). Therefore, the model was statistically significant.

**Table 4.12: Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.550	0.254		2.165	0.003
	Management commitment	0.701	0.119	0.0610	5.891	0.004
	Stakeholder participation	0.752	0.217	0.1085	3.465	0.002
	Resource allocation	0.786	0.226	0.2230	3.4779	0.003
	Digital inclusion	0.703	0.109	0.3304	6.4495	0.002

a. Dependent Variable: Service delivery

**Source: Research Data (2024)**

Results given in Table 4.12 reveal that the constant value is 0.550, which is mainly the level of the sustainable level of water project in Makueni County, Kenya, when management commitment, stakeholder participation, resource allocation, and digital inclusion are held constant. The regression coefficients suggest that enhancements in management commitment, stakeholder participation, resource allocation, and digital inclusion would increase the sustainability of water projects in Makueni County by 0.701, 0.752, 0.786, and 0.703, respectively. This information can be encapsulated in the subsequent regression equation;

$$Y = 0.550 + 0.701X_1 + 0.752X_2 + 0.786X_3 + 0.703X_4$$

Y = Project sustainability

X<sub>1</sub> = Management commitment

X<sub>2</sub> = Stakeholder participation

X<sub>3</sub> = Resource allocation

X<sub>4</sub> = Digital inclusion

The research demonstrated that management commitment significantly and positively affected the sustainability of water projects supported by the county government of Makueni, Kenya ( $\beta=0.061$ ,  $p=0.004$ ). These findings align with the work of Senbeta and Shu (2019), who explored management strategies during project implementation

and the sustainability of community-managed water projects. Their results indicated that the management approach of the water project had a greater influence on sustainability compared to water projects managed by local governments and NGOs.

The research indicated that stakeholder participation significantly and positively influenced the sustainability of water projects funded by the county government of Makueni, Kenya ( $\beta=0.1085$ ,  $p=0.002$ ). These findings align with the results of a research by Uwamariya, Safari, and Kengere (2021), which explored the significance of stakeholder in project sustainability in Rwanda, revealing a strong correlation between stakeholder engagement and project sustainability.

The research revealed that resource allocation significantly and positively influenced the sustainability of the water initiatives supported under Makueni county government in Kenya ( $\beta=0.223$ ,  $p=0.003$ ). This finding aligns with Sadiq's (2019) study, which examined the performance of Kenyan water services boards in relation to their resource allocation strategies. The results indicated that the effectiveness of these boards was enhanced by strategic development of personnel, financial resources, infrastructure, and technology.

The research demonstrated that digital inclusion significantly and positively impacts the sustainability of water projects that are financed by the Makueni County government in Kenya ( $\beta=0.3304$ ,  $p=0.002$ ). This finding aligns with Kozarkiewicz's (2020) study on digital inclusion and its influence on project management practices in Poland. Evidence suggests that the implementation of digital transformation has led to significant and beneficial enhancements in project management processes.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

In this chapter, the researcher will focus on the summary of the research, conclusion, recommendations and propositions of future study.

#### **5.2 Summary of Study**

##### **5.2.1 Management Commitment**

The paper aimed at evaluating the impact of management commitment and sustainability of county government of Makueni, Kenya funded water projects. The research ascertained that management commitment had a positive significant effect on the sustainability of water projects funded by the county government of Makueni, Kenya ( $\beta=0.061$ ,  $p=0.004$ ). Continuous trainings improves the skills of the project committee members, the management team is chosen because of their technical skill sin running water projects, arranged learning exchange visits improve project management skills of the committee members, the water committee members must have resource handling skills to serve the locals and the project committee members undertake to coordinate challenges with multiple stakeholders.

##### **5.2.2 Stakeholder Participation**

The research sought to assess the role of stakeholder participation and the sustainability of water projects funded by the county government of Makueni, Kenya. The research demonstrated that stakeholder engagement significantly positively influenced the sustainability of water projects financed by the county government of Makueni, Kenya ( $\beta=0.1085$ ,  $p=0.002$ ). The project is monitored by all stakeholders so that it maintains services to the communities, the water project employed skilled/unskilled labor force from the local community, the cost of the water projects is being shared between various

stakeholders (donors, national and county government) and all the stakeholders are involved in the decision process related to the water projects and the leaders of the projects report to the local people in every phase of the water project.

### **5.2.3Resource Allocation**

The research aimed at identifying the impact of allocation of resources and the sustainability of the water projects that are financed by the county government of Makueni in Kenya. The research proved that resource allocation significantly positively influenced the sustainability of water projects financed by the county government of Makueni, Kenya ( $\beta=0.223$ ,  $p=0.003$ ). Adequate financing is available for the maintenance services of the water project, with local community members providing locally sourced materials. The budgeted cost for the water project is partly paid by the constituency Development (CDF) funds and the water project budget goes through monitoring and evaluation process to reduce unnecessary expenses.

### **5.2.4Digital Inclusion**

The study sought to assess the relevance of digital inclusion and the sustainability of water projects funded by the county government of Makueni, Kenya. The study revealed that digital inclusion had a positive substantial effect on the sustainability of water projects funded by the county government of Makueni, Kenya ( $\beta=0.3304$ ,  $p=0.002$ ). The IT skills of staff determine which technologies to be used in the water project, use of modern technologies leads to accountability of resources for the water project, the information from the project is cannot be accessed without following a pre-defined channel and the choice of modern technology enables the managers to provide high quality of water to the locals.

### **5.3 Conclusions of the Study**

The research makes the subsequent conclusions based on research findings which are presented as follows;

#### **5.3.1 Management Commitment**

The study concludes that strong management commitment is vital for ensuring the allocation of essential resources financial, human, and technical—to water projects. This commitment aids in establishing clear goals and objectives, as well as in monitoring and evaluating project progress. Furthermore, it plays a key role in promoting community engagement and participation, fostering trust and collaboration with local communities, which is critical for the long-term success and sustainability of these initiatives. Additionally, management commitment ensures that the water projects align with the county government's broader development agenda and priorities, thereby enhancing their impact and benefits for the local population.

#### **5.3.2 Stakeholder Participation**

The research indicates that the engagement of stakeholders is vital for the sustainability of water initiatives in Makueni County, Kenya. By incorporating community members, local leaders, non-governmental organizations, and government bodies in the stages of planning, execution, and evaluation, projects are more likely to align with the needs of the community. This collaborative method cultivates trust, a sense of ownership, and endorsement for the projects, which are essential for their sustained survival. Additionally, stakeholder involvement facilitates the early detection of challenges and opportunities, leverages local expertise, and allows for timely modifications. Therefore, collaboration with stakeholders is fundamental to the success and sustainability of water projects that enhance the development and welfare of the region.

### **5.3.3 Resource Allocation**

The research concludes that efficient resource allocation is essential for the success and sustainability of water projects in Makueni County, Kenya. Through the meticulous prioritization and allocation of resources, including financial support, human resources, and materials, the county government can guarantee the efficient and effective execution of projects. Adequate resource distribution also mitigates the risks of delays and budget excesses, while promoting the sustainability of water initiatives by emphasizing maintenance and responsible water management practices. In summary, strategic resource allocation is crucial for enhancing the effectiveness of investments in water infrastructure and addressing the community's needs in Makueni County.

### **5.3.4 Digital Inclusion**

The study concludes that digital inclusion improves communication and engagement with local communities which help to build trust and collaboration between the government and the community, leading to more sustainable and successful water projects. The digital inclusion influences the sustainability of water projects through the use of technology to monitor and manage water resources through the use of sensors and data analytics which enable the county government to track water usage, identify leaks and inefficiencies, and make informed decisions about water management. This help to ensure that water projects are operating efficiently and effectively, leading to long-term sustainability.

### **5.4 Recommendations of the Study**

One comes to the subsequent recommendations made by the study basing on study concluding remarks;

#### **5.4.1 Management Commitment**

The study recommends that to strengthen management dedication to the sustainability of water projects in Makueni, Kenya, it is important to set explicit goals and objectives. Continuous training for project managers and personnel on sustainable water management techniques is vital. Engaging local communities in the planning and execution of projects will help ensure that these initiatives address the needs of the community. Additionally, it is critical to monitor and assess project performance over time to pinpoint areas that require enhancement. Adopting a comprehensive strategy that incorporates these elements can significantly enhance the long-term viability of water projects in the area.

#### **5.4.2 Stakeholder Participation**

The research recommends that the Makueni County government in Kenya ought to engage community members, local leaders, and other pertinent stakeholders in the planning, execution, and oversight of these initiatives. Such involvement is crucial to ensure that the projects align with the community's needs and priorities while promoting long-term sustainability. Regular consultations and feedback sessions with stakeholders can foster trust and transparency throughout the project implementation process. Additionally, this approach can facilitate the early identification of potential challenges or issues, enabling timely adjustments and solutions. Moreover, offering training and capacity-building opportunities to stakeholders can enable them to engage actively in the decision-making process, ultimately improving the success of water projects. This training may encompass areas such as water management, project monitoring, and financial management, among other relevant subjects.

### **5.4.3 Resource Allocation**

The research recommends that enhancing resource allocation methods involves implementing more efficient and effective strategies to ensure that the limited resources available for water projects in Makueni County are utilized in a sustainable manner. This could include conducting thorough needs assessments to identify priority areas for investment, utilizing data-driven decision-making processes to allocate resources where they are most needed, and implementing monitoring and evaluation mechanisms to track the impact of the investments over time. By enhancing resource allocation methods, the county government can ensure that water projects are not only implemented successfully but also maintained and sustained in the long term.

### **5.4.4 Digital Inclusion**

The authors of the study suggest that the County government needs to invest in technologies like mobile applications and online services which would be bringing real-time information about the availability of water in an area, quality, and usage. This would allow residents to easily access and monitor their water usage, report any issues or concerns, and receive updates on water conservation efforts. The County should provide digital training and resources to local communities on how to effectively use these technologies can help increase awareness and participation in water conservation efforts. This can include workshops on how to use water monitoring apps, online tutorials on sustainable water practices, and webinars on the importance of water conservation.

### **5.5 Suggestions for Further Study**

The current research revealed through the regression model that 24.6% of the variance is linked to factors not included in the analysis. Consequently, it is recommended that future research explore additional project management capabilities that were not

examined in this study. Furthermore, the study advocates for further investigations into the sustainability of water projects in other counties.

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## APPENDICES

### Appendix I: Introduction Letter

Kaluma Mutevu

P.O. Box 10496 – 00200,

NAIROBI.

Phone No.: +254724170758

Email: s.mutevu@gmail.com

Dear Respondent,

RE: PARTICIPATION IN DATAGATHERING

I am Kaluma Mutevu, doing my Masters' program and collecting data on the topic: “*Project management capabilities and sustainability of county government funded water projects in Makueni County, Kenya.*”. I request that you kindly participate in the study by filling the questionnaire and sharing your knowledge on the topic. This information will be utilized solely for educational reasons and to enable me develop this research project. Thank you for your willingness and readiness to assist me on this course.

Thank You.

**Kaluma Mutevu**

## Appendix II: Research Questionnaire

### SECTION I: Bio Data

Instructions:

- Do not indicate your name
- Fill all the blank spaces.

1. Your gender.

Male [ ] Female [ ]

2. your age.

20 –30 yrs. [ ] 30 – 40 yrs [ ] 40-50 yrs [ ] 50+ yrs [ ]

3. uppermost educational qualification.

Primary level [ ] Secondary level [ ] Certificate holder [ ]

Diploma holder [ ] Degree holder [ ] PhD holder [ ]

4. What title do you hold in this project?

Project Manager [ ] Committee member [ ]

Community leader [ ] Project beneficiary [ ]

5. Which type of water project is available in your locality?

Wells (no hand pumps) [ ] Boreholes (with hand pumps) [ ]

Water pipes (extended from water tanks) [ ] Dams [ ]

## SECTION2: MANAGEMENT COMMITMENT

Indicate the rating as applied on these statements on water committee management skills of your water project. Use the Likert scale.

*Ranges: 1–strongly disagrees, 2–disagrees, 3 –neutral, 4 –agrees and 5-strongly agrees*

<b>Management Commitment</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
The management team is chosen because of their technical skills in running water projects					
The management team has long experience in project management					
Committee members are picked based on their know-how on running water Projects					
The water committee members must have resource handling skills to serve The locals					
The project committee members undertake to coordinate challenges with Multiple stakeholders					
Continuous trainings improve the skills of the project committee members					
Arranged learning exchange visits improve project management skills of the Committee members					
Project committee membership with diverse skills leads to high cases of Project sustenance					

### SECTION 3: STAKEHOLDERS' PARTICIPATION

6. Indicate the ratings that you give each statement on stakeholder participation in your water project. Using the Likert scale.

*Ranges: 1–strongly disagrees, 2–disagrees, 3 –neutral, 4 –agrees and 5-strongly agrees*

<b>Stakeholders' participation</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Decision making involves all stakeholders as far as the water Projects are concerned					
The local people are empowered to do little maintenance work of the Water project					
The leaders of the project inform the local people about every phase of the Water project					
The water project also used skilled/unskilled labor force of the local Community					
All the stakeholders keep track of the project so that it can still benefit the Communities					
Different stakeholders (donors and national and county government ) cost share the cost of the water projects.					
The success of the water project is open to such contributions of the various stakeholders.					
Maintenance of the project is the responsibility of the local which keeps the project afloat					
The second stakeholder is the stakeholders who have helped the water projects to carry on greatly.					

#### SECTION4: RESOURCE ALLOCATION

State the ratings that you give each statement on stakeholder participation in your water project. Using the Likert scale.

*Ranges: 1–strongly disagrees, 2–disagrees, 3 –neutral, 4 –agrees and 5-strongly agrees*

<b>Budget Allocation</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
There is donor support for the water projects in our locality					
Sometimes, the stakeholders participate in raising funds for the water project					
The water project costs are handled by international donors and the county government					
The local community members contribute to the project by providing locally Available materials					
Sufficient funds are allocated for the maintenance services of the water project.					
The budgeted cost for the water project is partly paid by the constituency Development (CDF) funds					
Funds for water project maintenance is disbursed on a timely basis					
The water project budget goes through monitoring and evaluation process to Reduce unnecessary expenses					
The cash realized from the project is adequate to sustain the project					

## SECTION 5: DIGITAL INCLUSION

7. On the statements on technology choice, rate the extent to which you agree/disagree on your water project. Ratings apply using the Likert scale:

*Ranges: 1–strongly disagrees, 2–disagrees, 3 –neutral, 4 –agrees and 5-strongly agrees*

<b>Digital Inclusion</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Selecting appropriate technology has become a primary concern of our Project committee members					
The water project employ the use of innovative technologies that result in Long lasting projects					
The project uses digital pumping technology					
ICT systems are used for communication purposes in the water projects					
Use of modern technologies leads to accountability of resources for the water Project					
The information from the project is cannot be accessed without following a pre-defined channel.					
The choice of modern technology enables the managers to provide high Quality of water to the locals					
The IT skills of staff determines which technologies to be used in the water Project					
Data from the project is continually stored					
Use of modern technologies increases sustainability measures of the water projects					
The project managers use available pumping technologies based on solar Energy to sustain the operations of the project					
The water project sustainability relies on adopted technology effectiveness					

## SECTION 6: SUSTAINABILITY OF WATER PROJECTS

The following statements relate to how the extent of sustainability of water projects at Makueni County. Give your perception of the current status of the water projects in your locality. Using the scale of:

*Ranges: 1–strongly disagrees, 2–disagrees, 3 –neutral, 4 –agrees and 5-strongly agrees*

<b>Sustainability of Water Projects</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
The water project is available as there is constant flow of water to be used by the Community.					
The locals have access to water throughout the year due to the project					
The water projects are long lasting as they are maintained.					
The upgrading of the water projects increases the sustainability of the projects					
The success of the project is made certain through monitoring and evaluation of the project.					
The water project has a longer span when it observes quality standards of the projects.					

### **Appendix III: Completed Water Projects**

1. Katilini Dam
2. Ulu Borehole Number 3
3. Kilombo Dam
4. D4 Borehole
5. Kwangumu Borehole
6. Kwa Eka Dam
7. Kwa Mbila Dam
8. Itangini Borehole
9. Nguleta Dam
10. Kwevose Dam
11. Kimbingo Pipeline Water Project
12. Kambiwa Pipeline Water Project
13. KwaMusyimi Sand Dam Water Project
14. KwaMwaniki Sand Dam Water Project
15. KwaKakulu Pipeline Water Project
16. Kwa Sammy Shallow Well Water Project
17. KwaMutuku Shallow Well Water Project
18. KwaMukusu Shallow Well Water Project
19. KwaKisalu Sand Dam Water Project
20. Mulala Pipeline Water Project
21. Maatha Borehole Water Project
22. Mwanyani Borehole Water Project
23. Tutini Borehole Water Project
24. Emali Water Project Emali 15

25. Matiku Earth Dam Water Project Mulala
26. Mwanyani Earth Dam Water Project Mulala
27. KwaMuthama Borehole Water Project Emali
28. Kyunguni Sand Dam Water Project Emali
29. Mutua Earth Dam Water Project Mulala
30. Masaani Earth Dam Water Project Mulala
31. KwaNgumbi Sand Dam Water Project
32. Muini Sand Dam Water Project
33. Wes Soil Sand Dam Water Project
34. Matiku Shallow Well Water Project
35. KwaNgiti Shallow Water Project
36. Barazani Shallow Water Project
37. Kiliini Borehole Water Project
38. Mutyambua Borehole Water Project
39. KwaSelee Sand Dam Water Project
40. Kelengeni Water Project
41. Manooni Water Project
42. Kavuthu Dispensary Borehole Water Project

## Appendix IV: Research Authorization Letter



KENYATTA UNIVERSITY  
GRADUATE SCHOOL

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NAIROBI, KENYA  
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Our Ref: D53/PT/CTY/29481/2014

DATE: 22<sup>nd</sup> November, 2024

Director General,  
National Commission for Science, Technology  
and Innovation  
P.O. Box 30623-00100  
**NAIROBI**

Dear Sir/Madam,

**RE: RESEARCH AUTHORIZATION FOR KALUMA MUTEVU - REG. NO. D53/PT/CTY/29481/2014**

I write to introduce **Kaluma Mutevu** who is a Postgraduate Student of this University. The student is registered for M.B.A degree programme in the **Department of Management Science**.

**Kaluma** intends to conduct research for a M.B.A Project Proposal entitled, **“Project Management Capabilities and sustainability of water Projects Funded by the County Government of Makueni , Kenya.”**

Any assistance given will be highly appreciated.

Yours faithfully,

  
**PROF. ELIUD NJAGI**  
**EXECUTIVE DEAN, GRADUATE SCHOOL**






AM/K

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Page 1 of 1

## Appendix V: NACOSTI Permit

 <b>REPUBLIC OF KENYA</b>	 <b>NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY &amp; INNOVATION</b>
<b>Ref No: 490396</b>	<b>Date of Issue: 15/January/2025</b>
<b>RESEARCH LICENSE</b>	
	
<b>This is to Certify that Mr.. Kaluma Mutevu of Kenyatta University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Makueni on the topic: PROJECT MANAGEMENT CAPABILITIES AND SUSTAINABILITY OF WATER PROJECTS FUNDED BY THE COUNTY GOVERNMENT OF MAKUENI, KENYA for the period ending : 15/January/2026.</b>	
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