

**BENEFICIARY-DRIVEN IMPLEMENTATION AND
SUSTAINABILITY OF BOREHOLE WATER PROJECTS IN KENYA: A
CASE OF TIGANIA WEST SUBCOUNTY IN MERU COUNTY**

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DECLARATION

This research project is my original work and has never been issued by anyone in any University for an academic award.

Signature



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This research project has been submitted for defense with my approval as the University Supervisor.

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DEDICATION

I dedicate this research project to my family, who have significantly supported and motivated me during my study and research.

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I acknowledge all the individuals who contributed to the project in one way or another.

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TABLE OF CONTENTS

DECLARATION.....	ii
DEDICATION.....	iii
ACKNOWLEDGEMENT.....	iv
TABLE OF CONTENTS	v
LIST OF TABLES	ix
LIST OF FIGURES	x
ABBREVIATIONS AND ACRONYMS.....	xi
ABSTRACT.....	xii
CHAPTER ONE	13
INTRODUCTION.....	13
1.1 Background of the study	13
1.1.2 The Role of Water in the Global Society	13
1.1.3 Status of the Global Water Projects	14
1.1.4 The Level of Access and Supply of Water in Kenya.....	16
1.1.5 The Future of Water Resources in Kenya.....	16
1.1.6 The Relevance of Beneficiary Participation in the Water Project process	17
1.2 The Problem Statement.....	18
1.3 The Study Purpose	19
1.4 Objectives of the Research.....	19
1.5 Study Questions	20
1.6 Research Significance	20
CHAPTER TWO	22
LITERATURE REVIEW	22
2.1 Introduction.....	22
2.2 Continuous Existence of Borehole Water Projects	22
2.3 Implementation of Borehole Water Projects.....	23

2.4 Technical Capacity Development of Borehole Water Projects	25
2.5 Governance Structures and Management of Borehole Water Projects.....	26
2.6 Resource Mobilization for Borehole Water Projects	29
2.7 Monitoring and Control for Borehole Water Projects	30
2.8 Theoretical Framework.....	32
2.8.1 Stakeholder Theory.....	32
2.8.2 Resource Base View Theory.....	33
2.8.3 Agency Theory.....	33
2.8.4 General Systems Theory	34
2.9 Conceptual Framework.....	35
2.10 Literature Review Summary	36
2.11 Research Gaps.....	37
CHAPTER THREE.....	45
RESEARCH METHODOLOGY	45
3.1 Introduction.....	45
3.2 Research design	45
3.3 Target Population.....	45
3.4 Sample population and sampling technique	46
3.4.1 Sampling Size	46
3.3.2 Sampling Procedures	47
3.5 Data collection tools	47
3.6 Pilot Testing.....	48
3.7 Validity	48
3.8 Reliability.....	49
3.9 Data Collection Procedures.....	49
3.10 Data analysis	50
3.11 Ethical Considerations	51

3.12 Operational Definition of Variables.....	51
DATA ANALYSIS, PRESENTATION, AND INTERPRETATION	55
4.1 Introduction.....	55
4.1 Respondents' Response Rate.....	55
4.3 Technical capacity and development in the sustainability of borehole water projects.....	58
4.4 Governance Structures in the sustainability of borehole water projects.....	59
4.5 Resource mobilization in the sustainability of borehole water projects	60
4.6 Monitoring and Control in the sustainability of borehole water projects	60
4.1 Correlation Analysis	61
CHAPTER FIVE	64
SUMMARY OF THE FINDINGS, DISCUSSIONS, AND CONCLUSIONS	64
5.1 Introduction.....	64
5.2 Summary of the research findings	64
5.2.1 Technical Capacity.....	64
5.2.2 Governance Structures	64
5.2.3 Resource mobilization i	65
5.2.4 Monitoring and Control	65
5.2.5 The Sustainability Trend of borehole water projects in the Tigania West sub-county...	66
5.3 Discussions of the Findings	66
5.3.1 Technical Capacity	66
5.3.2 Governance Structures	67
5.3.3 Resource mobilization	68
5.3.4 Monitoring and Control	68
5.3.5 The Sustainability Trend of borehole water projects in the Tigania West sub-county...	69
5.4 Conclusions.....	69
5.5 Recommendations.....	69
REFERENCES.....	1

APPENDICES	Error! Bookmark not defined.
Appendix I: Letter of Transmittal	Error! Bookmark not defined.
Appendix II: Research License	Error! Bookmark not defined.
Appendix III: Introduction Letter	Error! Bookmark not defined.
Appendix IV: Research Questionnaire	10
Appendix V: Demography of the Respondents	14
Appendix VI: Factors influencing implementation and sustainability	14

LIST OF TABLES

Table 2.1: Research Gaps	37
Table 3.1: Target Population.....	46
Table 3.2: Sampling Frame.....	47
Table 3.3: Operation of the Defined Variables	51
Table 4.1: Respondents' response rate	57
Table 4.2: Sex of the Respondents.....	55
Table 4.3: Age of the Respondents	56
Table 4.4: Respondents' level of education	57
Table 4.5: Respondents' Work Experience	57
Table 4.6: Technical capacity	60
Table 4.7: Governance structure	61
Table 4.8: Resource mobilization	62
Table 4.9: Monitoring and control	63
Table 4.10: Correlation analysis	64

LIST OF FIGURES

Figure 2.1: Conceptual framework	36
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ABBREVIATIONS AND ACRONYMS

AGM	Annual General Meetings
AMREF	African Medical and Research Foundation
CDF	Constituency Development Fund
CM	Community Management
CO	Community Organization
COWSOs	Community Own Water Supply Organizations
CPM	Community Participation and Management
GoK	Government of Kenya
IcFEM	Interchristian Fellowships' Evangelical Mission
NRWSSP	National Rural Water Supply and Sanitation Programme
O&M	Operation and Maintenance
RBV	Resource-Based View
SDG	Sustainable Development Goal
SPSS	Statistical Package for Social Sciences
TASAF	Tanzania Social Action Fund
USA	United States of America
VL0M	Village Level Operation and Maintenance
WCED	World Commission on Environment and Development
WSPs	Water Service Providers

ABSTRACT

Water projects are crucial as they provide the water necessary to sustain human life, ecological systems, and social and economic development. The unsuccessful collapse of water projects at their development, implementation, or completion period negatively affects the targeted population who depends on these projects to supply clean water for their daily requirements and consumption. The study investigated the role of beneficiary-driven implementation on the manageability of borehole water projects in the Tigania West sub-county, Meru County, in Kenya. The primary purpose was to establish the influence that the end users have during the implementation stage of these projects on the implementation and continuous existence of borehole water projects in the Tigania West sub-county. The study focused on end-user involvement through technical capacity development, governance structures, resource mobilization, and monitoring and control of borehole water projects. The study utilized a descriptive research design with a sample size of 416 respondents among 12 borehole projects spread across the five wards. Data analysis was performed using SPSS version 25.0, to which questionnaire responses were subjected. On technical capacity and development, training and expertise received 78.8% and 67.1%, respectively; on governance structure, change in leadership and transparency and accountability scored 93.5% and 93.3%, respectively; on resource mobilization, availability of materials received 56.3%; and on monitoring and control, management supervisory and project reviews received 74.5% and 73.3% of the responses. Improvement in availability and accessibility of clean water stands at 46.6%, indicating that it is still below the recommended levels. The respondents consistently mentioned corruption and the role of devolution as other factors that significantly influence the implementation and sustainability of the projects. The study established that 35.5% of the respondents agreed on the improvement in the sustainability of borehole water projects. The study concluded that the involvement of the beneficiaries is crucial to the successful outcome of community-based projects. Thus, the study recommended that beneficiary-driven participation should be promoted, initiation of relevant training and expertise, and stakeholders must ensure leadership competencies for the implementation and sustainability of the borehole water projects.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Climate change has been a central event of critical concern due to its significant influence on essential human activities. Numerous proofs have been published on how climate change, directly and indirectly, impacts the water cycle, particularly the security and amount of water available for routine use in different sectors of fundamental importance (Abanyie, et al., 2019; Ananga-b, 2015). The disruption of the water sources, such as surface waters and boreholes, minimizes the availability of sufficient water for navigation, energy production, and drinking by the fauna and flora. Different governmental and nongovernmental organizations have initiated many borehole projects to eliminate water scarcity in response to this alarming menace of climate change and its consequent effects on water shortage (Arieko & Kisimbii, 2020). Successful implementations of these projects have been witnessed across different environments, yet their sustainability has experienced continuous challenges in the 21st century.

Several works of literature on effective project management have identified that the participation of the end-users during implementations and management processes has significantly enabled sustainability (Akumu & Onono, 2017; Godden & Ison, 2019). Community involvement and engagements in community-based borehole projects promote ownership and responsibility toward ensuring sustainability (Brown & Wocha, 2017). This research project thus presents the understanding of the roles and influence of the beneficiaries in the borehole project implementation and sustainability with a critical focus on Tigania West Subcounty, Meru County in Kenya.

1.1.2 The Role of Water in the Global Society

Water is a natural resource central to sustainable human development and a critical source for every wildlife. It is indicated that a country's social stability, economic development, and growth within the current impacts of climate change are attributed to its ability to ensure water security (Bazaanah, 2019). Understanding the role of water in global society revolves around contesting and conflicting examinations surrounding the virtues of its materialistic and resource mobilization. On one end, it is a vital entity required for economic, scientific, legal, and religious development, while on the other, it erodes infrastructures and property boundaries, pollutes, flows, or is

distributed across space and time (Andriamihaja, Metz, Zaehring, Fischer, & Messerli, 2021). Despite the arguments, the role of water in society remains critical as a natural resource and in global governance. The actions of the international organizations portray this to create control, security, integration, and collaboration in managing and using water sources, particularly the rivers and oceans.

To foster the fulfillment of the United Nations Sustainable Development Goals (SDGs) as projected by 2030, every stakeholder must rethink and redefine access, use, and management of water as a natural resource (Daluwatte, 2019). An integrated approach toward universal access to safe water enables the creation of resilient economies and societies through investing in water-related infrastructures. Investment strategies that capture the comprehensive functions of the environment and enhance water-dependent projects are essential for creating a healthy environment. Water has become the most significant connector of most of the seventeen SDGs; that is, reliable availability of water is critical to food production and security; hence no poverty, clean water, and sanitation, zero hunger, climatic action, reduced inequalities, sustainable cities and communities among others are achieved (Imburgia, Osbahr, Cardey, & Momsen, 2020). Therefore, activities that enhance water's value must be initiated globally, first by identifying, accounting for, and diversifying the interconnections between water and human needs and socioeconomic well-being in the ecosystem. Then by enhancing education and public awareness of the central importance of water and its role in contributing to the comprehensive dimensions of life (Karia & Wong, 2011). Also, adequate investment in infrastructure, institutions, and innovations offers sustainable water supplies and reduces the risk of water insecurities.

1.1.3 Status of the Global Water Projects

In the last hundred years, the global demand and use of freshwater have rapidly increased to six times and continue to widen yearly with the emerging economies, rapidly growing human population, and shifts in consumption patterns. Currently, agriculture, particularly aquaculture, irrigation, and livestock, utilize 69% of the global water, while the industry consumes 19%, and municipalities use 12% of the total water (UNESCO, 2021). Different studies project that by 2050, the current demand for fresh water, with forms 2.5% of the entire global water, will increase to more than 30%, with the developing pressures from steady population growth, economies, and climatic changes (Abanyie, et al., 2019; Brink & Petersen, 2020; Curato, 2018). The United

Nations report of 2018 indicates that about 2 billion people exact pressure on the available water, while more than half of the global population experience water shortages at least once every 12 months, forcing more than 1.6 billion people to experience economic challenges due to water shortages (Godden & Ison, 2019).

Approximately two billion people access boreholes daily for water needs, with more than two hundred million global rural populations supplied with water from locally-operated manual boreholes (Arieko & Kisimbii, 2020). Further appropriate monetary accountability, stakeholder participation in every single phase of the water project, strengthening of the associated communities, adequate skills were generally lacking, and poor formulation of M&E designs (Otti & Ezenwaji, 2019). Also, Rivett et al. (2018) investigated the causes of ineffective outcomes in World Bank Water and Sanitation projects in the United States. They concluded that many water projects were significantly scheduled and under cost, and few samples of projects underperformed based on the objectives set in the implementation stage, institutional development, and sustainability of the particular project (Rivett, et al., 2018).

The crucial role of technical capacity and development of both personnel and equipment required for the continuous sustainability of borehole projects needs relevant education and training. To meet the ongoing requirement for water supply and the need to eliminate the rising concerns of its scarcity in sub-Saharan Africa, more than thirty-five thousand boreholes are dug annually in compliance with SDG 6, general availability of safe and affordable drinking water (Thomas, Ambres, Borja-Vega, & Sturzenegger, 2018). This is still below the request due to the increasing water pollution, industrialization, and population growth, thus requiring a projection of more than fifty-five thousand boreholes dug annually to meet the target by 2050. The drilling and construction of boreholes have long been associated with external constructors based on the required skills, expertise, and equipment, posing an expertise challenge to the donors and the local governments (Kosgey, 2020). Targeted community involvement creates a meaningful environment for association, training, awareness, and understanding of the inputs, hence creating a vital sphere for comprehensive communication between the community, development agencies, and the donor on the project's impact on the community (Lufingo, 2019). Continuous and steady investment in rural water supply development has been at the center of development plans between

heads of state and development experts to eliminate environmental degradation and climatic change impacts.

1.1.4 The Level of Access and Supply of Water in Kenya

Good governance enhances donations, partnerships, and collaborations toward funding or initiating a prospective innovation that positively impacts underdeveloped countries by reducing poverty and alleviating human suffering. As a significant world population resides in rural areas, stakeholders, governments, policymakers, and donors have supported many water projects to ensure sustainable availability of safe, required amount and clean to this significant population. In many sub-Saharan African countries, especially landlocked countries and those with limited fresh surface water sources, groundwater has become an essential alternative, thus promoting borehole and sustainability of most of these donors or state-funded projects centrally depend on governance factors that may differ from country to country or based on local community leadership systems.

In Kenya, community water projects have always experienced political influence based on their essential theme of concern identified by potential or aspiring politicians. Since these water projects significantly require financial support from CDF, the County government, and other donors, the incumbent politicians always have the management and individual committees tasked with delivering successful projects. As a result, these community initiatives have witnessed political interference in the committee (Mbui, 2018). This can also be attributed to the many committees claiming to be legitimate water project members. According to Kenya's review report on clean water supply and sustainable water governance ideologies, Tigania West Subcounty in Meru County is within the leeward side of Mt. Kenya, has unreliable and insignificant rainfall, and relatively has insufficient permanent surface water sources (Kiara & Luketero, 2018). Most sections of the Tigania West sub-county have deep-lying groundwater resources that require mechanized means and deeper penetrations to access the water onto the ground surface for at least one hundred and fifty meters, presenting a significant challenge to resource mobilization. At times this underground water is salty, and the borehole depths have consistently resulted in their failures, even with wind pumps (Obeng, Inddrisu, & Eshun, 2020). However, with the lack of comprehensive water catchment courses, huge water volumes are wasted away during the wet seasons in the Indian Ocean.

1.1.5 The Future of Water Resources in Kenya

Kenya forms part of the water-scarce nations in sub-Saharan Africa, with eighty percent of its land experiencing unreliable rainfall or arid and semi-arid land (Mulei & Gachengo, 2021). It contains three-fifth of the freshwater supplies, which is two fifth less than the recommended volume by the United Nations concerning its per capita income. For Kenyans, particularly in village areas, to appreciate their water right and cater to their steady demand for water resources, community water ownership innovations must be supported and initiated (Olela, 2018). To address the significance of uninterrupted water supply in the 21st century, the government of Kenya, through various policies, partnerships, initiatives, and donations, has constructed various water dams, boreholes, and tunnels to increase availability and access to affordable clean water for community use. These initiatives by the Kenyan government and the support of devolution will significantly improve the sustainability of the existing borehole projects and increase their implementations in various counties in Kenya.

1.1.6 The Relevance of Beneficiary Participation in the Water Project process

Beneficiary-driven implementations and sustainability remain critical challenges due to undefined terms and levels of involvement required. In North America, particularly in Michigan, training of beneficiaries or end-users on the importance of water conservation and management witnessed significant sustenance of the projects despite other challenges experienced (World Bank, 2015). Community sensitization, education, awareness, and support promote collective responsibility, commitments, and partnerships that shield the locals' required management, security, and project conservation. Thus, the local community is paramount to the success and failures of community projects as they deeply understand the basic but critical structures of community operations.

Water projects are crucial as they provide the water necessary to sustain human life, ecological systems, and social and economic development. According to Omondi, Odek, and Siringi (2020), water projects should be organized using available resources to achieve the set objective in terms of time, scope, and cost (Omondi, Odek, & Siringi, 2020). The importance of beneficiary participation for sustainable development has been recognized for some time, but within the water discipline, there was little recognition of its centrality (Kiara & Luketero, 2018). Inefficiencies in implementing borehole water projects are cited as contributing to this problem. Water being a decentralized function, the Meru County government consistently invests highly in drilling several boreholes. Poor implementation strategies of community boreholes have profound effects

involving the health, economic, education, and social life of Tigania West Subcounty locals (Kosgey, 2020). Failures of the drilled boreholes result in long queuing or tracking of the known surface water sources, inflicting negative impacts on the Hygiene and Sanitation events leading to diseases, increased school inconsistencies among students, pupils, and teachers, and increased conflicts related to water access (Ndede, 2019).

1.2 The Problem Statement

In many global education systems, the vital contributions of water towards sustainable development have been limitedly expressed, leading to the souring of human influences in the global water systems. The generalized upshot understanding that water production involves an eternal source through cycles of evaporation, condensation, and precipitation from the seas into the atmosphere and descended into the earth has consistently led to the abuse of water via human activities. The enormous industrial waste deposits witness these actions into the rivers, climatic changes, retreats of ice sheets and glaciers, global warming, microplastic raindrops, and enhanced acidic oceans (Jimenez, et al., 2019).

According to WASREB (2018), reduced availability of water continues to be an event of significant debate in Kenya, influxes majorly by inefficient governance of water supply systems, consistent cases of droughts, steady rise in the demands for water needs, and pollution of the available water influenced by the observed steady rise in the population growth (WAASREB, 2018). Kenya's unsustainability of community water boreholes projects significantly contributes to the community's education, socioeconomic, and health challenges. The government and non-governmental organizations have invested much in sponsoring different local water initiatives in Kenyan communities, including Tigania West Subcounty. Despite this extensive support for the community water supply initiatives implemented by the chosen project committees, such initiatives either have become non-functional, stalled, function under capacity, or benefit the selected population of individuals, especially the management committees' preferred households. Unsuccessful operation of these projects at total capacity or failure before their initiation stages negatively impacts the local members depending on these ventures to supply clean water in required volumes across relevant households and distances (Kituku, 2020).

The major hindrances to the water project development have been the insufficient or improper planning and coordination of development efforts in the Tigania West Subcounty. The Subcounty's issues have neither been clearly articulated nor fully understood. A practical benchmarking system has not been sufficiently developed to review the thoughts and ideas of actual project end users in local community-based initiatives (Ivongo & Chege, 2019).

Various studies have been done concerning sustainability and end-users' participation in water projects. They include Wanyera (2016), who looked at the impacts of community engagement on the consistent availability of community-initiated projects with a central focus on the Kiambiu water and sanitation slum initiative found within Kenya's capital city (Wanyera, 2016). Arieko and Kisimbii (2020) sought rural social participation in implementing and planning underground water schemes in Migori County, Kenya (Arieko & Kisimbii, 2020). Omwana and Muchai (2020) assessed the impacts of post-implementation local engagements on the nourishment of underground water initiatives in Embu-Kenya (Omwana & Muchai, 2020). These studies, however, did not significantly capture the essential functions of the end-users-driven implementation of the existence of borehole water projects, especially in Tigania West Subcounty, Kenya, as addressed by this research project.

1.3 The Study Purpose

The study identifies beneficiary-driven implementation's central role in the effective management of borehole water projects in Kenya with relevance to Tigania West Subcounty in Meru County, Kenya.

1.4 Objectives of the Research

The research project addressed the following objectives:

- i. To evaluate the effects of technical capacity development on borehole water projects in Tigania West Subcounty in Meru County, Kenya.
- ii. To assess beneficiary-based governance structures' influence on borehole water initiatives' sustainability in Tigania West Subcounty in Meru County, Kenya.
- iii. To determine beneficiary resource mobilization's influence on borehole water projects' sustainability in Tigania West Subcounty in Meru County, Kenya.

- iv. To establish the impacts of monitoring and control on the manageability of borehole water initiatives in Tigania West Subcounty in Meru County, Kenya.

1.5 Study Questions

The study attempted to present solutions to the following research questions:

- i. To what level does beneficiary technical potential impact borehole water initiatives' manageability in Tigania West Subcounty in Meru County, Kenya?
- ii. How do governance structures manipulate the existence of borehole water initiatives in Tigania West Subcounty in Meru County, Kenya?
- iii. To what level does water resource mobilization control the consistent availability of borehole water projects in Tigania West Subcounty in Meru County, Kenya?
- iv. What is the critical role of monitoring and control in effectively managing borehole water projects in Tigania West Subcounty in Meru, Kenya?

1.6 Research Significance

The project outcomes enlighten the Meru County government and local community members on the objective means and mechanisms for solving water scarcity, such as water-saving technologies and techniques. The study also provides a relevant and insightful knowledge base supporting community participation by creating awareness of adaptation measures to foster the consistent availability of borehole water initiatives. In particular, the residents in Tigania West Subcounty are informed about their essential roles in the actualization and sustainability of the borehole water initiatives and the benefits of appropriating water resource use and effective management. It captures the best practices and lessons from similar projects within Kenya and beyond the borders.

The researchers and academicians are enriched with the recent findings from the study, hence improving their knowledge to enable more exploration and investigations of sustainable borehole water projects and accompanying challenges. The study report further provides the reviewed information and reference material to investigators, scholars, and organizations intending to develop impactful ideas for future reorganizations in enhancing water security, access, governance, and supply. Thus, this research project is a tool for upcoming students and investigators to figure out the existing gaps in the current research and improve ongoing

investigations on sustainable borehole water projects and their essentialities within Tigania West sub-county, Meru County in Kenya.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section reviewed relevant studies on the sustainability of borehole water initiatives. It outlines the data from different investigators, scholars, and investigators who have conducted their explorations in the area of water projects and their relevance to human existence. The chapter presents the literature review on beneficiary-driven implementation, technical capacity development, governance structures, resource mobilization, monitoring and control, an inspection of theories, and the development of concepts. The study lastly mentions the knowledge gaps that this research project attempted to fulfill.

2.2 Continuous Existence of Borehole Water Projects

The idea of sustainability has been firmly connected to environmental events and, in biology, is characterized as the sum or degree to which the world's assets might be taken advantage of without harm to the climate (Ananga-a, Agong', Acheampong, Njoh, & Hayombe, 2020). The United Nations World Commission on Climate and Advancement (WCED) report characterized supportable advancements as improvements that address the current generation's issues without interfering with the capacity of people in the future to address their needs. This definition denoted a fundamental shift from the possibility of supportability as principally a concern of the environment to one that underscores improvement's financial and social cycles (Akumu & Onono, 2017).

A few examinations have recognized different determinants of the manageability of provincial water supply frameworks. Nonetheless, as per Nyakwaka and Benard (2019), the sustainability of regional water supply offices is subject to many variables, including strategy, legitimate and institutional systems, social factors like interest in water, local area support, and local area association; economic and monetary factors, for example, the capacity to achieve the expense of upkeep and ability to support administrations financially; technological aspects like innovation-decision, accessibility of extra parts and activity and supervision, and in the conclusion of the management factors (Nyakwaka & Benard, 2019).

Likewise, end clients frequently have significant trouble supporting the operation and maintenance (O&M) of the water supply framework over the valuable existence of the equipment. Regardless of the gigantic endeavors and interests in developing the water supply framework, around 63.1% of the local population in Kenya, which means 16.5 million people, depends on harmful water (Imburgia, Osbahr, Cardey, & Momsen, 2020). Water supply frameworks' post-development operation and maintenance (O&M) is a significant test. Great authority assumes various parts in local area-based projects, requiring trust and significant management collaborations with neighborhood members and experts. Pioneers need time, assets, and power to acquire assets into an undertaking to lay out decent compatibility (Riziki, Atera, & Juma, 2019). Adaptability is essential in how leaders identify their and others' roles and the exercises they embrace.

2.3 Implementation of Borehole Water Projects

For quite a while, beneficiary investment and management have been viewed by most emerging nations as fundamental instruments to improve public commitment and responsibility for improvement undertakings to achieve project success and manageability. Support assumes a huge part in peoples' administration of their engagements. Possession and control of assets significantly influence cooperation in the projects being developed. Local area association, community administration, more excellent financial and social uniformity, better admittance to administrations for all, more prominent support, decision-making, and more profound contribution in organizing process that aims at strengthening individuals (Njogu, 2014). Every one of these is pointed toward accomplishing sustainability being developed initiative.

As per Mahama and Badu-Nyarko (2014), poor communities need such associations. However, there is a critical demand to recognize local area engagement and local area sustenance since the impression of what these ideologies mean varies significantly (Mahama & Badu-Nyarko, 2014). The previous is a consultative interaction intended to lay out networks as powerful dynamic substances. In contrast, the latter is a base-up improvement design by which the recipients of the water availability take on an entire obligation, leadership, and command over it.

Support is not clear, and being authentic expects essential social consideration and democratic commitment (Mutesi & Odhuno, 2021). Second, recipient inclusion at the most minimal fitting level can become practical with suitable institutional help, where state-run administrations do not

disregard their obligations to empower networks to understand this. To this end, a certified district or territorial association will be expected to guarantee the schemes' long-term usefulness and back the projects they promote. As a wellspring of prepared specialists, it is vital to strengthen and persuade the community, periodically confirm the support execution, and ensure an adequate and proper spare parts production network. As referenced, most communities have space for development concerning limited development and organizational support. Little consideration is now issued to foundations accomplishing such results (Masum, 2018).

Subsequently, a more evident procedure should be characterized for both the execution stage and after project fulfillment, in which a suitable asset portion should be recognized. Another principal limit is the insight that acquisition is essential for community authority and, in this manner, significant to the projects' good outcome (de Souza Filho & Miranda, 2019). The feeling of responsibility and genuine lawful duty for rural water substances over their recently developed water sections is directly differentiated from the locals' priorly comprehension. The initiators individually worked in recognizing sites and building the projects, and in the event of a failure, the residents never fixed them, clearly expressing that the initiators owned them. There is a boundless sense that responsibility for the water service agencies will prompt liability regarding its prosperity. A community possesses a facility that is not guaranteed to lead an obligation for its administration, nor does it ensure a readiness to oversee or pay for its activity and upkeep (Mwakazi, 2017). In this way, it might be more powerful to leave the longing to accomplish local area proprietorship and foster a feeling of obligation to fund the upkeep of the office.

One significant illustration of a recipient-based way to deal with giving local water is South Africa's public water and hygiene initiative initiated in 1994, one of the biggest in Africa. The objective of this model was to give cost-effective but fundamental water broadly. Basri, Findayani, and Zarefar (2021) found that nearby states had restricted the ability to actualize and fund the accessible, essential water strategy (Basri, Findayani, & Zarefar, 2021).

Using study information from Sri Lanka and India, Chukwuma (2016) found that well-constructed and successfully designed water administrations experience two critical elements for practical community-based approaches. The author tracked down it fundamental to include household individuals in the planning cycle and in an ultimate conclusion about the type of framework to construct (Chukwuma, 2016). Similarly, systems work better, assuming the families' commitment

to development is checked. Social capital was viewed as related to the over two variables. Local area individuals are bound to participate in planning and observing in networks with more significant levels of social capital, especially with more dynamic community gatherings.

Utilizing a household study done in the Ghanaian Volta basin in 2001, Marks et al. (2018) inspected support choices for superior water availability. They identified that within the families with availability to further developed water, a vast proportion, around 43%, kept on involving perilous sources as their essential homegrown water source. The authors utilize a discrete choice model to dissect supply and interest qualities where the reliant factor is a family's choice to pick the better water origin (Marks-b, Kumpel, Guo, Bartram, & Davis, 2018).

While the religious and local leaders cooperatively sought financing organizations and accomplices to guarantee their dream of affordable, dependable, and clean water is accomplished, this would kill the deluge of water-borne sicknesses experienced nearby. Because of their diligent efforts, local community healthcare workers objectively responded to the call for water safety and sanitation training in partnership with Icfem and The Water Project in Mwitha.

2.4 Technical Capacity Development of Borehole Water Projects

Technical sustainability relies on the individuals keeping up with their degree of interest during the development, implementation, and sustenance phases. This raises issues in gravity-stream schemes, whose individuals will generally complete crisis fixes depending on the situation instead of preventive support. Pumped projects require care of the siphons and energy buying. The members lay out fundamental maintenance frameworks, set levies, and organize mechanisms for gathering income and purchasing power. It further suggests that the local community individuals be prepared, so they should do simple repairs at whatever point there is an issue with the water system (Kayode, Borode, & Adedokun, 2019). This will guarantee that water supply to the local area individuals is ensured and will be finished in the future.

As per Abanyie et al. (2019), this water supply framework impacts communities' capacity to support it because rural networks can deal with the least challenging water supply frameworks. Different water service frameworks are perplexing and demand a specific specialized ability to deal with, meaning that in the event of any obliteration in the water framework, the local area will do without water for quite a while as they look for specialists to come and do repairs (Abanyie, et

al., 2019). Most specialists do not come from the neighborhood town/local area and should be obtained from far. Abanyie et al. (2019) likewise reasoned that local technical operators are considered the most suitable choice for undertaking specialized, functional O&M exercises for a local area-based water services supplier. For practicality, these roles should be appointed to people who have undergone special preparation, particularly O&M training, and have acquired insight. Professionals ought to be recruited and specified proportionate to the work they do. Requests for support ought to illuminate the choice of whether to employ them part-time or routinely (Project Management Institute, 2017). Experts ought to have clear sets of responsibilities.

This trap is related to inadequate funding for support and substitution, the absence of specialized staff at the project level, and the unavailability of borehole hardware spare parts in good spots. The dispute over spare parts can be ascribed to the way that associated water spare parts are least stocked by vendors or some water plans utilizing obsolete advances whose extras are currently outdated (Obeng, Inddrisu, & Eshun, 2020). Also, regulatory resolutions in the water area might not have sufficiently resolved relevant issues which concern the maintenance and upkeep of local area-based water projects.

Particular expertise or equipment is expected to investigate water origins in perplexing hydrogeological orientations or other manually intricate achievements. For instance, in the disinfection of surface water, specific care should be considered to protect and guarantee items and hardware to lay out water access, and a dispersion framework is found within the community to the most extreme degree conceivable. The primary guideline directs that innovation should be kept straightforward. It should fit the nation and consider the local experience (Gauthier & Moran, 2018). A purposeful endeavor ought to be made to normalize all special equipment.

2.5 Governance Structures and Management of Borehole Water Projects

Excellent governance requires a comprehensive and long-term objective on practical human actions to fulfill such improvement objectives. This can occur by understanding the verifiable, cultural, and social settings and a reasonable qualification between good administration and legislative issues (Daly, Ninglekhu, Hollenbach, Duyne-Barenstein, & Nguyen, 2017).

Golini, De Marchi, Boffelli, and Kalchschmidt (2018) express that in Malaysia, the five components of governance standards are isolated as essential: Straightforwardness, Responsibility

(Golini, Landoni, & Kalchschmidt, 2018), Support (Mimicopoulos, 2016), control of corruption (de Souza Filho & Miranda, 2019) and Value (Johnson & Svara, 2015). Project governance includes liabilities, cycles, arrangements, and value frameworks that empower ventures to accomplish authoritative goals and cultivate execution that upholds the transcendent interests and needs of outside and inner partners other than the actual undertaking. Hence, projects have become the way to accomplish effective authoritative change and vital objectives (Sheedy & Griffins, 2018). Powerful undertaking administration is a huge determinant of the progress of the venture. It is fundamental for the feasible and fruitful accomplishment of significant worth for the elaborate partners and the association (Agyei-Boapeah, Ntim, & Fusu, 2019).

For the most part, project governance underscores associating the initiative management team, its patrons, and different partners. It additionally centers around the venture targets and how to accomplish them while observing project execution. Accordingly, project governance may be considered initiating and utilizing control. This is because of its essential oversight job of controlling and organizing the endeavors of players with regards to the task; it additionally upgrades the agreement required towards the accomplishment of venture objective in a field where different assorted interests of partners are impacting everything (Obeng, Inddrisu, & Eshun, 2020). Project governance establishes the construction through which the venture's targets are set and decides how to accomplish the reasons and the procedures for checking the presentation.

Water governance ought to empower the consideration and cooperation of a local community in dealing with their water. It influences the administration of water to various degrees in society. Prado (2019) saw that legislatures and benefactors ought to establish a climate where the local communities and the private sector could expect the role of giving water supplies (Prado, 2019). For administration at this level to be viable, it requires a climate that advances a granular perspective to improvement and energizes support of a local area at the most reduced level being developed ventures. In a review led by Imburgia, Osbahr, Cardey, and Momsen (2020) in evaluating cooperation in neighborhood administration, it was found that support worked better when residents felt they would influence the local authority or when the drive had essential points that were probably going to affect their daily routines immediately (Imburgia, Osbahr, Cardey, & Momsen, 2020). In advancing economies in Asia, Latin America, and Africa, studies uncover that in any event, when a democracy system is not drilled, the governance type cycle could deliver a

more fruitful help conveyance by restricting the job of the state and advancing the deliberate support and collaboration of the confidential area and common society associations (Sheedy & Griffins, 2018).

Excellent local administration should give the general population popularity-based and equal chances to participate. For decentralization to become a reality, focal states and improvement offices should surrender or impart control to a local community. As recognized by Nyakwaka and Benard (2019), conditions under which this can happen are broad cooperation of all partners and components to guarantee that those in power at the local level are considered responsible for their activities (Nyakwaka & Benard, 2019).

Water panels are one of the typical types of rural water frameworks through which recipients should partake in the execution of local area projects and offer the advantage. A water board of trustees comprises project leaders who supervise the working of an initiative in the interest of the whole community. Misalignment or underdevelopment of undertaking administration instruments impedes execution. In this manner, these obstruct the arrangement of project entertainers' strong and adequately adaptable reactions to a specific violent climate. Chukwuma (2016) expressed that a viable project administration structure diminishes clashes among partner groups, adding to an exceptional company presentation. It likewise upholds overseeing and limiting task risk, developing transparency among different levels of the association, and upgrade of positive data trade among numerous groups of partners. Chukwuma (2016) analyzed local area participation in craftsmanship undertakings in Lesotho. The review's discoveries uncovered that the handicraft projects had a panel of individuals whom the projects' recipients did not choose; at this point, they were accused of running the daily activities and overseeing funds. The study uncovered that these committees' individuals did not work sufficiently in project management (Chukwuma, 2016). Notwithstanding, the review is centralized on Handicrafts Activities, while the current exploration will focus on local borehole water projects.

Brown and Wocha (2017) evaluated community cooperation in Water Supply and Sanitation activities in Temeke, Tanzania. They distinguished that water project pioneers manage issues, such as preparing necessary spending plans, obtaining labor and products, and creating basic activity plans (Brown & Wocha, 2017). A little gathering of authorities commonly finishes such exercises chosen and commanded by its individuals and expected to give input to the whole community.

This research applied the co-relational strategy for information examination, while the proposed study will utilize descriptive data analysis.

2.6 Resource Mobilization for Borehole Water Projects

This is a fundamental connection to project sustainability. For Prado (2019), projects and resource preparation are exclusively related since the previous relies upon the latter to accomplish anticipated output and results. Projects fail when they fall beneath specified asset assembly standards (Prado, 2019). Curato (2018) outlines that resource mobilization is enormous to the extent that the operation and sustenance of contributor projects are concerned (Curato, 2018). The part of asset activation additionally involves the setting of water levies. Asset activation includes; gaining financial assets, planning human resources, securing substantial assets, community inclusion and cooperation, responsibility and transparency, financial bookkeeping, and management.

Numerous donor projects neglect to be reasonable for a lengthy period because of high tariffs presented by the management committee or poor resource mobilization abilities that considers the project impractical over the long haul (Daluwatte, 2019). In any event, there usually is critical underfunding for actual expenses of working and fixing offices. This situation is perfect, particularly in provincial regions/inside regions, where water supply administration costs are higher while affordability is lower as tariffs cover operation costs.

In light of multiple factors, Imburgia et al. (2020) see that local area water projects include stock and occasional monetary exchanges. Also, operations and maintenance happen daily as breakages, wear, and tear happens (Imburgia, Osbahr, Cardey, & Momsen, 2020). Where water must be siphoned from underground using electric power, the community either covers individual power bills or buys fuel for generators, which should likewise go through incidental fixes. Project advisory groups sometimes utilize people to perform administrative, technical, and security tasks (Njogu, 2014)

Masum (2018) interviewed Tanzania Social Action Fund (TASAF) authorities and figured out that TASAF worked through Water Advisory groups. Data obtained from sources uncovered that they worked transparently with the village-level-based water councils and the project organizers affirmed this. Likewise, the rules used to select committee individuals were training, residence,

gender, work responsibility, age, cooperation in project exercises, genuineness, and eagerness to volunteer because most works was done deliberately (Masum, 2018). Installments were possibly made when individuals went through recompenses and transport support. The methodology upgraded better execution of TASAF water projects.

2.7 Monitoring and Control for Borehole Water Projects

There is an arising pattern in the global community concerning the requirement for worthwhile projects and emphasizing that those who participated in project execution are responsible for their general effect. This pattern has expanded the attention on M&E practice in estimating performance (Thomas, Anbres, Borja-Vega, & Sturzenegger, 2018). Thus, M&E in the formative field should assume two imperative parts; show responsibility for assets to project partners and shore up implementation by giving pertinent data to work with sound administration choices. The latter infers that M&E builds the limit of the project team to answer and make due, which converts into better venture execution and, in this way, project supportability (Gauthier & Moran, 2018).

Utilizing the perceived guidelines and practices by connecting M&E to brilliant courses of action and work plans centers around productivity and cost-viability, operating a participatory way to deal with observing and assessing progress. Using global and local ability, broadly dispersing results, utilizing information from various sources, and utilizing data for program improvement further develop program accomplishment through practical implementations of M&E exercises. This is because the M&E framework, in light of best practices, advances proof-based navigation and public certainty (Winch & Leiringer, 2016).

The M&E cycle offers a few advantages to the execution of projects in that it coordinates the program by monitoring progress other than checking whether program progress is being made concerning pre-laid out goals and proposing measures for development when called. It likewise advances responsibility by giving exact proof of the program's viability and evaluating the exhibition of various partners, making them responsible to one another and the more extensive public. It provides the data in an organized and formalized way, which permits examination of the utilization of assets and spotlights on the reasons for issues as opposed to the sign of trouble—in this way, fostering learning by attracting illustrations for a fact to persistently improve projects' pertinence, viability, productivity, effect, and sustainability (Burger & Esrey, 2019). M&E

energizes authoritative improvement by connecting all association individuals in the M&E cycle and sharing the obligation and ideas learned to form the staff's skills (Azqueta & Montoya, 2017). Savelli, Schwartz, and Ahlers (2019) noticed that assessment considering M&E rehearses moved from the investigation of input and result, their connected cycles of causality, to evaluating the impact, influence, and long-term consequences (Savelli, Schwartz, & Ahlers, 2019). In this manner, formative professionals should embrace M&E practices in all features of the task cycle to guarantee better execution as well as manageability

The investigation discovered that sound institutional structures to complete the water area reforms satisfactorily were not accurately functional. There were additionally improper plan projects to expand water offices to all areas in Kenya. There could have been no appropriate public observing and assessment components for water administration deliveries and no legitimate venture programs in the water area to perform water reforms effectively. The research suggested a requirement for very organized and planned programs and M&E frameworks to achieve the ever-evolving expansion of the water supply foundation to all Kenyans (Daluwatte, 2019).

Assurance capacities connect with the abilities of the project founders to survey a task, establish the necessary components to effectively convey it, and report project progress to pertinent partners (Thomas, Ambres, Borja-Vega, & Sturzenegger, 2018). Project owners that have adequate confirmation capacities and can convey them can evaluate the advancement of an undertaking; distinguish significant early admonition signs prone to cause project disappointments.

Project controls correlate to coordination, including arranging and checking, going to restorative lengths, and rethinking projects. Because undertaking the examination give the premise to either going to remedial lengths, replanning, or keeping up with the steady speed. Processes utilized for project control incorporate acquired esteem technique, achievement following timetable, utilization of key execution markers, and essential path investigation (Jimenez, et al., 2019). Moreover, subjective appraisal, like project chief discourse on progress and fundamental issues, is supported as many interaction devices are quantitative and may not capture events that should be portrayed yet are fundamental (Ananga-a, Agong', Acheampong, Njoh, & Hayombe, 2020). Where the undertaking provider gives data to project supervision, they may not provide data concerning issues they face except if such matters are at a high-level stage and perceptibly by all. An option is for project owners to plan information for project control. This more significant

contribution to the delivery of undertakings has been ascribed to positive task results (Burger & Esrey, 2019). This, in any case, requires more assets, which are not accessible all the time.

2.8 Theoretical Framework

Theoretical framework refers to examining the theories that form the applied reason for understanding, analyzing, and planning ways of exploring connections inside the study factors (Knox, 2017). This part examines the study's theoretical underpinning by exploring the partner, asset base view, agencies, and general frameworks hypotheses.

2.8.1 Stakeholder Theory

This hypothesis was developed by Freeman (1984). He contended that organizations honestly do expressly deal with their associations with various stakeholder associations for them to accomplish the projects. Partners of an initiative can be inside, including proprietors, clients, workers, and providers, or outside, for example, states, contenders, customer advocates, recipients, traditionalists, and broadcast/web-based entertainment. Freeman (1984) depicts these presents as a group or person who may impact or is impacted by accomplishing the task's goals (Freeman-a, 1984). As per Freeman (1984), chiefs should acquire their stakeholders' support and comprehend how their organizations can impact or be affected by others to accomplish corporate goals. Consequently, a manager should focus on the company's associations with its partners by tracking down ways of adjusting and coordinating the different associations and dreams an organization comprehends (Freeman-b & McVea, 2001).

Individuals in the community, particularly recipients, are partners in local area initiatives; consequently, including them in project movement from the outset is fundamental. Stakeholder's theory contends that each actual individual or gathering taking part in the exercises of a firm or association does as such to get advantages and that the need of the interest of all certifiable partners is not (Freeman-c, Harisson, Wicks, Parmar, & De Colle, 2010). The theory pays similar beliefs to be inner and outer partners: staff, supervisors and proprietors, agents, clients, providers, government, local area, and particular vested parties.

Project end-users' cooperation upgrades social goodwill through the perception of the benefit of collaborating in an organization with one another and associations. It also gains monetary worth via the activation of willful gifts to convey support and skills improvement, which upgrades the opportunities for work and development in the local area abundance and allows residents to foster

the abilities and organizations expected to address social avoidance. A project manager should guarantee that the undertaking recipients deliberately and effectively partake in the tasks in the initial stages. This theory also stresses that local area individuals additionally benefit from their investment. The methodology gave a basis to study the impacts of community commitment on the manageability of borehole water initiatives in the Tigania West sub-county in Meru, Kenya.

2.8.2 Resource Base View Theory

RBV of the firm hypothesized that assets interior to the presentation of ventures were sources of an upper hand. Such assets were important, intriguing, unique, and challenging to substitute. Resources accepted to be gainful were those fit for working with the origination or execution of special exhibition techniques, taking advantage of fantastic market opportunities, or killing looming dangers.

The two suspicions for the RBV hypothesis were that assets and abilities were heterogeneously dispersed among firms and that support and capacities were incompletely portable, making firms' disparities stable over long periods. Each firm was unique from others regarding the assets and capabilities the firm has or accesses. These distinctions separated one firm from another, and a company's prosperity was because of its firm's peculiar assets (Kiara & Luketero, 2018). The RBV of firms significantly stressed their inward assets and shortcomings, rather than modern association financial matters, which focus on firms' outer opportunities and dangers. Because when the outside climate is unsteady, a company's assets and capacities might be simpler to control

The asset centralized viewpoint battles that the exhibition of project assortment is unique to every foundation so that each firm could be considered heterogeneous from the other. No two organizations have similar encounters, obtained similar resources or abilities, or constructed a similar hierarchical culture. A differential blessing of assets among firms was a definitive determinant of critical choices (Akumu & Onono, 2017). This theory makes sense of the impact of technical limit advancement and asset activation on the supportability of borehole water projects in Tigania West Subcounty in Meru County, Kenya.

2.8.3 Agency Theory

The Agency Theory was first presented by Stephen Ross and Barry Mitnick in 1973. An office issue seems when specialists' objectives vary from the administrators, and it is troublesome or costly to confirm whether specialists have conducted the assigned work. This issue likewise

emerges when it is upsetting or exorbitant to check that specialists can finish the authorized work given.

The agency theory perceives that an establishment's detachment of possession and control creates irreconcilable circumstances between the foundation's investors and managers, which infers project execution. The explanation is that, in many cases, supervisors are to utilize the company's assets for their potential benefit, adversely influencing investors' abundance expansion (Prado, 2019). The theory additionally brings the jobs of managerial decision freedoms and different outside and inside checking and holding systems to the front of hypothetical conversations and empirical examination. This hypothesis supports the impact of administration structures on the manageability of borehole water projects in Tigania West Subcounty in Meru Area, Kenya.

2.8.4 General Systems Theory

This theory is credited to achievements by von Bertalanffy (1968), who saw a framework as a bunch of interrelated and reliant components, where each piece influences the working of the entirety. In upholding the theory, von Bertalanffy underscored that those standard systems are associated with their environments creating new properties for continuous advancement. Von Bertalanffy suggested that general system theory focused on the dependency of different sections that make an item whole rather than decreasing the associated components to fulfill desired characteristics (Von Bertalanffy, 1968). This relationship within the systems' free components is substantial in the different divisions like finance, bookkeeping, human resource, examination, and improvement.

Similar perceptions and association guidelines of different disciplines allow their collaboration. Keraro (2014) saw that the general system hypothesis develops deal aider with a device for examining categorical items without speculating how an association ought to be managed. Keraro (2014) saw that a system is sampling a section to achieve a good goal. If a single part of the system is taken out, the system's information is also changed. The research perceives that project manageability impacts WSPs in Kenya in the general theoretical approach. Given this theory, the primary recognizable association factors were individuals, authority, networks, cycles, human and monetary assets, correspondence frameworks, position, and power. The system theory sees every one of these as the parts that, whenever composed in a calculated way, will prompt a well-performing association (Keraro, 2014). The overall framework hypothesis suggests that the various

foundation pieces should not be overseen in seclusion. Applying this hypothesis acknowledges how various subsystems work interrelated to improve hierarchical execution. Contrasting the former conversation with the research system hypothesis thinking will assist with picturing that what might appear to be a disengaged issue is essential for an affiliated organization of related topics (Project Management Institute, 2017).

An essential supposition of a system is that the entire is more than the number of parts and cannot exist in disengagement; hence, its communication with the climate should be considered. As indicated by Friedman and Scholnick (2014), each plan is an exceptional substance of completeness recognizable from different frameworks by a characterized limit (Friedman & Scholnick, 2014). In such a manner, von Bertalanffy's system theory separates open and closed systems, accessible frameworks that trade matter with their surroundings, unlike closed systems, which are disconnected from their domains (Von Bertalanffy, 1968). According to this point of view, a closed system has a couple of factors, while an open system regularly manages more complex interrelationships. Receptiveness is a primary quality for system functioning that empowers it to get inputs from its current circumstance and cycle them in the system to produce outcomes that are sent back to the climate to impact results (Friedman & Scholnick, 2014). Hence, the system theories are pertinent to the review because the task yield is planned to influence the climate emphatically, and a sound effect must be felt if a project's creation is reasonable. This theory made sense of the connection between observing and controlling tasks and the presentation of water and sanitation projects by the Northern Water Works Improvement Organization.

2.9 Conceptual Framework

The conceptual system presents a relationship between the factors in a figure form. The study investigates whether technical capacity development, governance structures, resource mobilization, and monitoring and control determine the manageability of borehole water ventures in Tigania West Subcounty in Meru, Kenya. Figure 1 indicates the relationship between the variables.

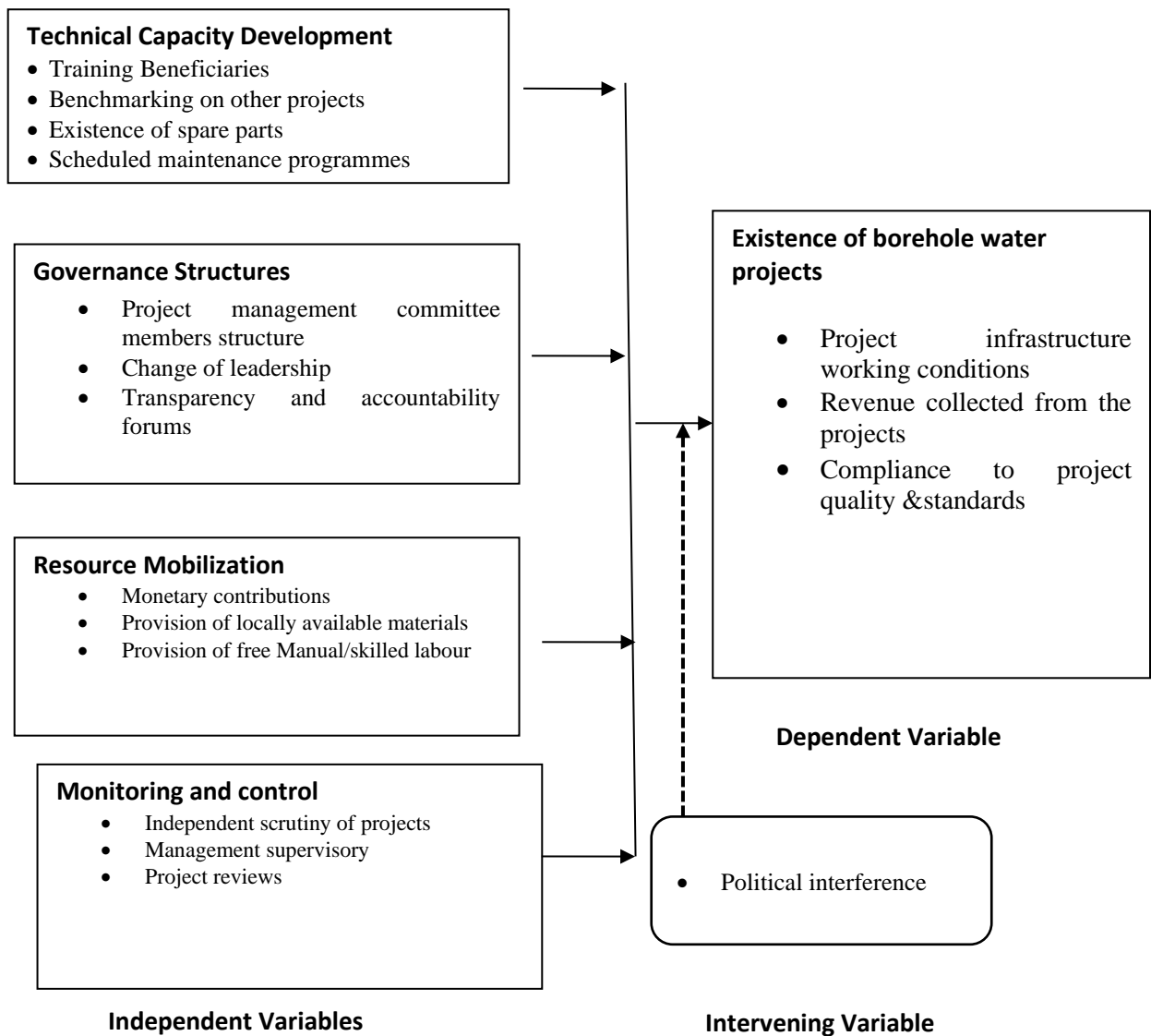


Figure 2.1: conceptual framework

2.10 Literature Review Summary

The prolonged existence of community water projects relies upon the recipients and must be guaranteed without assuming that every one of its individuals is socially included at all project stages. Social comprehensiveness advances values like fairness, uniformity, regard, trust, and the freedom to approach cooperation. These qualities work with community cohesiveness, which encourages community cooperation, responsibility for, and eagerness to contribute towards its

sustainability. This guarantee adjusted portrayal in community project management and limits clashes emerging from a shared asset. Projects with insignificant conflicts are more manageable than those with disagreements, which sometimes lead to try and court directives preventing or restricting the operation of the initiatives. For local area water ventures to be practical, they need the commitment of both orientations, and they ought to be managed efficiently to enable levels of integrity and equity.

The literature reviewed established that governance of the drilled boreholes is an essential pillar of the existence of water projects. Another pillar mentioned is the level of beneficiary participation, and in particular, a clear and elaborate understanding of the notion of community participation needs to be devised to measure its benefits. Lastly, the stages of community participation are categorized in the form of a ladder where successive steps strongly depend on the preceding ones.

2.11 Research Gaps

The following are the research gaps in the literature studied. Table 2.1 illustrates the holes found.

Table 2.1: Research Gaps

Scholar (s)	Project Title	Method	Study Outcomes	Identified Research Gap	The focus of the Study
Wanyera (2016)	Influence of community participation on sustainability of community-based projects: a case of Kiambiu water and sanitation slum project,	The investigation applied a descriptive survey research design.	The study reasoned that community support in local area-based projects essentially impacts the projects' existence; manageability is harmed	The study did not investigate borehole water projects	This study centrally focused on the borehole water projects in Tigania West Subcounty in Meru County in Kenya

	Nairobi County, Kenya		when regional area cooperation is insignificant and advances with more prominent community investment.		
Ananga (2015)	The role of community participation in water production and management: Lessons from sustainable aid in Africa international sponsored water schemes in Kisumu, Kenya	Revealing responses to these inquiries involved the utilization of a mixed methods approach. The methodology included the utilization of both statistical and narrative procedures	The study identified that families who use locally governed water events and secure water and hygiene gatherings will often rehearse better water utility hygiene in the settlements.	The study did not focus on the aspect of sustainability of borehole water projects. Moreover, the study used the mixed research method	The research project attempted to establish the connection between recipient-driven execution and supportability of borehole water projects in Tigania West Subcounty in Meru County.

Alelah and Mueke (2017)	Influence of Community Participation on Sustainability of Water and Sanitation Projects in Rhonda Slum in Nakuru County, Kenya	The authors employed a descriptive survey research design utilizing statistical and theoretical methodologies .	The research established that there was a critical ideal impact between local area investment and supportability of WASH projects	The study did not look at the same independent variables on which the current research focused.	This project presented the role of the dependent and independent variables influencing the recipient-driven performance of borehole water projects in Tigania West Subcounty in Meru County.
Arieko and Kisimbii (2020)	Local Community Participation in Planning and Implementation of Borehole Water Projects in Migori County, Kenya	The study utilized a descriptive survey examination design to achieve its purpose.	The study reasons that the area's incorporated advancement plan, education levels, socio-cultural issues, and local area mindfulness impacts regional	The study only focused on one variable that the current research examined within Migori County	This study presented several factors that interfere with the successful connection between recipient-driven execution and

			community cooperation in the preparation and execution of borehole water projects witnessed in Migori County.		supportability of borehole water projects in Kenya: an instance of Tigania West Subcounty in Meru County.
Omanwa and Muchai (2020)	Effects of post-implementation community participation on sustainability of borehole water projects in Embu County, Kenya	The research employed a cross-sectional research plan.	Concerning financial transparency and responsibility, recipients' Eagerness to finance water, accessibility of required assets to secure management and maintenance costs, local authority demands for water, utilization of	The study employed a cross-sectional research design, whereas the current study uses the descriptive research design	This research project utilized the descriptive design for data collection and analysis to investigate borehole water projects in Tigania West Subcounty in Meru County.

			accounting abilities in Borehole projects leadership and accounting for household installments were statistically critical		
Muniu (2017)	Monitoring and evaluation practices, community participation and sustainability of community water projects in Kenya: a case of Nyeri county	The research applied a mixed-method examination supported by a concurrent triangulation	The study stated that M&E Practices affected the connection between community support and manageability of local area water projects.	The study was not on borehole projects	This study centralized fits findings from the borehole water projects in Tigania West Subcounty in Meru County.
Mwangangi , and Wanyoike (2016).	Analysis of factors affecting the sustainability of community borehole water projects in	A descriptive design was adopted	Most community individuals were not sufficiently involved in the identification of initiative	The study looked at general factors	This study addressed specific factors on Technical capacity, governance, resource

	Kyuso, Kitui County, Kenya		needs (mean 3.30), arranging (implies 3.12), and preparing (mean 3.29). The community paid upkeep charges		mobilization, and monitoring and control to understand the connection between recipient-driven execution and supportability of borehole water projects in Kenya: an instance of Tigania West Subcounty in Meru County.
Ndetaulwa (2019)	The Influence of Resource Mobilization on the Sustainability of Community Water Projects: A Case Study	This research utilized a case study research approach	The discoveries uncovered that sufficient financial assets for the sustainability of the MAKILENG	The research was done in another country	This project established the connection between recipient-driven execution and

	of MAKILENGA		A water initiative could be accomplished when there are adequate inner sources of income, for example, water charges and retained profit.		supportability of borehole water projects in Kenya: an instance of Tigania West Subcounty in Meru County.
Mulei and Gachengo (2021)	Community capacity development and sustainability of county government-funded water projects in Makueni County, Kenya	A descriptive analysis design was used	The study discoveries demonstrated that interest in community capability and local area arranging boundaries of community capacity advancement is directly connected with the maintainability of Makueni County Government-	The study was limited to county government-funded water projects	This study captures different borehole water projects in Tigania West Subcounty in Meru County.

			supported water projects.		
Riziki, Atera and Juma (2019)	Influence of resource mobilization on the sustainability of community water projects in Kakamega County	An explanatory survey approach was utilized	The review presumed that asset activation significantly impacts the maintainability of community water projects in Kakamega County.	The study employed an explanatory survey approach	This research employed descriptive statistics to establish the connection between recipient-driven execution and supportability of borehole water projects in Tigania West Subcounty in Meru County.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the researcher's methods and techniques for directing this research project. These include Study design, sampling techniques, data assortment techniques, data assortment instruments, information collection, target population, operational factors, and data examination. Thus, it summarizes the measures employed to ensure the reliability and validity of data, its analysis, and its presentation.

3.2 Research design

In this study, a descriptive research design was used. A descriptive approach decides the recurrence of something happening or the connection between factors (Ghauri, Gronhaug, & Strange, 2020). The study design enabled extensive data gathering through descriptions and an understanding of distinguishing characteristics. Mohajan (2017) declares that a descriptive approach aims to acquire data that depicts uniqueness by seeking inquiries connecting individual perspectives and perceptions (Mohajan, 2017). Data gathering utilized structured questionnaires to collect qualitative and quantitative information.

3.3 Target Population

The target population was the 12 borehole water projects in Tigania West Subcounty in Meru County, Kenya. This comprises the borehole water projects spread across Mbeu, Athwana, Nkomo, Akithi, and Kianjai wards. Representatives from the twelve advancement offices and government officials from the Ministry of Water and Irrigation made up the majority of the examination units. The target population also included members of the community from various administration councils in order to guarantee objective data from the officials and take correlation into account.

The study significantly involved members of the administrative councils, the administrative staff in the CBOs, NGOs, and RBOs, and authorities from the Ministry of Water and Irrigation within Tigania West Subcounty. This was ensured to capture the critical populace directly involved in the sustainability of borehole water projects. Overall, 416 respondents from the targeted population of

427 were sampled for the study (Table 2). The RBOs involved in the projects were Kenya Methodists, Catholics, and Anglican churches; NGOs were Ripple international and AMREF, and CBOs were CIFORD and Mwangaza. To enhance the effectiveness of the sample, the study participants involved were those considered knowledgeable in community borehole water initiatives.

Table 3:1 Target Population

Category	Source	Population
Administrative councils	Mbeu, Athwana, Nkomo, Akithi, and Kianjai (12 projects)	228
RBOs, NGOs, and CBOs officials	Kenya Methodists, Ripple International, and CIFORD (12 projects)	157
Government officials from the Ministry of Water and Irrigation	Tigania West Subcounty Office	42
The total Target population for questionnaire sampling		427

3.4 Sample population and sampling technique

Sampling is an intentional mandate of different individuals to issue data from which research draws outcomes on a larger population represented by an influential group of individuals—the section centers around the sample population and sampling procedures.

3.4.1 Sampling Size

This population segment speaks to everyone in the population (Yin, 2017). Using the Kothari (2004) recipe, the sample population of 416 is calculated from the target population of 427 with a 95% CI and an error of 0.05.

$$n = \frac{z^2 \cdot N \cdot \hat{p}^2}{(N - 1)e^2 + z^2 \hat{p}^2}$$

From the above formula;

n = Sample size,

N = Target population size

e = Error of omission

\hat{p} = Standard deviation of the targeted population

Z = Standard variation at 95% confidence level.

Table 2:2 Sampling Frame

Category	Population	Ratio	Sample size
Administrative councils	228	0.98	223
RBOs, NGOs, and CBOs officials	157	0.98	154
Government officials from the Ministry of Water and Irrigation	42	0.93	39
Total	427		416

3.4.2 Sampling Procedures

Representatives from the twelve advancement offices and government officials from the Ministry of Water and Irrigation made up the majority of the examination units. The target population also included members of the community from various administration councils in order to guarantee objective data from the officials and take correlation into account. The technique includes separating the population into significant layers, inferring that the selection will probably have more delegates (Cassel, Cunliffe, & Grandy, 2017).

3.5 Data collection tools

A semi-structured questionnaire was one of the main methods the researcher employed to gather data. To enable rich data, the questionnaire included open-ended, closed-ended, and matrix questions. The arranged questions had options for the respondent to choose from, and they were nearly finished. Unstructured questions were open-ended and aided respondents in providing their responses or broader opinions. These questions were simple to understand and allowed the respondent to express their opinions on the subject, enabling a more profound level of response.

3.6 Pilot Testing

The pilot testing plans to lay out the research instrumentation's reliability and validity and improve face legitimacy. From the pilot results, validity and reliability were analyzed. The pilot testing was conducted using the questionnaire to forty-one various administrative authorities who were not respondents in the research, making up a tenth of the sample size. The pilot group was designed through randomized sampling and consisted of three representatives from each of the 12 boreholes projects and five county government officials. Allen (2017) suggests that personal interviews should do the questionnaire pre-tests to notice the respondents' responses and mentalities (Allen, 2017). All questionnaire sections were pre-tried, including question content, phrasing, grouping, structure and format, question advancement, and guidelines. The feedback from the pilot group engaged advanced the adjustment of the questionnaire before being issued to the targeted respondents.

3.7 Validity

As per Cohen, Manion, and Morrison (2017), validity is the exactness and defined derivations given the research outcomes. One of the primary purposes of directing the pilot study is to determine the relevance of the survey. This research project utilized both face and content legitimacy to decide the validity of questionnaires. Content legitimacy draws considerable space from test performance compared to the tests (Cohen, Manion, & Morrison, 2017). Content validity is concerned with target population representativeness. The test items' information and abilities should match the extensive information and abilities domain. The data obtained from the pilot group were comprehensively scrutinized and compared with other findings from similar projects, particularly the Tigania West sub-county Ministry of Water and Irrigation office, to ascertain data validity.

3.8 Reliability

Reliability is expanded by including numerous comparative articles for an action, testing a different sample of people, and utilizing uniform testing techniques. It is the level of consistency with which it estimates anything it intends to calculate (Mohajan, 2017). The investigator obtained pilot data from 41 people from the population target to test the reliability of the study instruments. Reliability is attractive in whether or not the consequences of research are repeatable. The reliability coefficient of the exploration technique was employed using Cronbach's alpha (α) which is determined as follows:

$$A = k/k-1 \times [1 - \sum (S^2) / \sum S^2 \text{sum}]$$

From this:

α = Cronbach's alpha

k = Number of respondents

$\sum (S^2)$ = Difference of individual items summary

$\sum S^2 \text{sum}$ = Difference of summarized scores

SPSS version 25 was employed to perform the reliability coefficient of the research items.

3.9 Data Collection Procedures

Data collection was initiated following approval by the University of Nairobi academic and the local leadership to perform the research project; this permitted the investigator to gather the essential information from the respondents. The investigator practiced care and control, ensuring all survey questionnaires were delivered to participants and received back. This challenging but essential task was accomplished by practical registry and record keeping of all the issued questionnaires; this enabled 97% return of the distributed articles. Twelve research assistants were trained and directly involved in the data collection process to provide relevant assistance and clarifications on fundamental inquiries of the respondents. The research assistants hired were individuals from Mbeu, Athwana, Nkomo, Akithi, and Kianjai wards as they understood the geography of Tigania West Subcounty, where the study was conducted. The drop-and-pick technique was utilized in regulating the questionnaires and allowing respondents to present

thoroughly examined reactions (Wang, 2015). Primary data were solely collected using the participants' questionnaire responses, which offered qualitative and quantitative data. Secondary data were obtained from published journals, NGO project reports from the Ministry of Water and Irrigations, and Meru County Strategic Plan 2018-2025.

3.10 Data analysis

The primary data obtained from the field was sufficiently cleaned, coded, aligned, entered into a computer, and analyzed accordingly. The primary data were analyzed using Statistical Package for Social Sciences (SPSS Version 25.0). Every questionnaire received was referred to, and items in the survey were coded to enhance information updates. After error elimination, descriptive statistics, including frequencies, rates, mean scores, and standard deviations, were assessed for every quantitative variable, and data was further displayed as tables and charts. Descriptive statistics empower the portrayal and circulation of scores or estimations utilizing a couple of records. The qualitative information from the inquiries that could go either way was broken down using the content examination. Qualitative data gathered were coordinated, sorted out, coded, and significantly analyzed based on the themes presented by seeking significance and drawing conclusions and interpretations based on ideologies.

Inferential data examination was completed utilizing multiple regression examination. Multiple regression examination was used to lay out the relations between the dependent and independent factors. This analysis was used since the procedure employs at least two independent factors to foresee unstable factors. Since there are five autonomous factors in this research project, the multiple regression approach was utilized in the following condition;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \epsilon$$

Represented as: -

Y= Sustainable borehole water projects

β_0 = Neutral

$\beta_1, \beta_2, \beta_3, \beta_4$ and β_5 = Regression coefficients

X_2 = Technical support

X₃= Governance structures

X₄= Resource mobilization

X₅= Monitoring and control

ε= Error term

3.11 Ethical Considerations

The research ethics were significantly adhered to before, during, and after the study was conducted. The research idea was succinctly elaborated for the respondents, and any inquiries on confidentiality and anonymity were effectively addressed. All participants were guaranteed conscious participation and the freedom to withdraw from the study without punishment. There was no coaxing of the participants. A synopsis of the final report on the overview will also be accessible to the organizations and participants upon demand. Throughout the study activities, moral standards were observed for every individual, informed consent of the participants was sought before administering the questionnaire, and assurance of the confidentiality of the information and data collected. Measures were strictly taken to enhance the confidentiality and privacy of every study respondent.

3.12 Operational Definition of Variables

Table 4 presents the activities that were involved in the definition of variables, considering their relevant indicators, type of statistical analysis, research approach, and measurements

Table 3.3: Operation of Variables

Research Objectives	Variable	Measuring of Indicators	Tools of analysis	Types of Analysis
To evaluate the effects of technical capacity	Technical capacity and development	Availability of expertise Benchmarking	➤ Descriptive statistics ➤ Inferential statistics	➤ Descriptive quantitative analysis

<p>development on the sustainability of borehole water projects in Tigania West Subcounty in Meru County, Kenya.</p>		<p>Training Beneficiaries</p>		<p>➤ Regression examination</p>
<p>To assess beneficiary-based governance structures' influence on borehole water initiatives' sustainability in Tigania West Subcounty in Meru County, Kenya.</p>	<p>Governance structures</p>	<p>Project management committee members and structure Leader's integrity Change of leadership Transparency and accountability forums</p>	<p>➤ Descriptive statistics ➤ Inferential statistics</p>	<p>➤ Descriptive statistics ➤ Regression analysis</p>
<p>To determine beneficiary resource mobilization's influence on borehole water</p>	<p>Resource mobilization</p>	<p>Community contribution Local resources Free labor</p>	<p>➤ Descriptive statistics ➤ Inferential statistics</p>	<p>➤ Descriptive statistics ➤ Regression analysis</p>

projects' sustainability in Tigania West Subcounty in Meru County, Kenya.		Availability of materials for free, like stones		
To establish the impacts of monitoring and control on the sustainability of borehole water initiatives in Tigania West Subcounty in Meru County, Kenya.	Monitoring and control	Independent scrutiny of projects Management supervisory Project reviews Benchmarking exercises Project audits Post project evaluations	<ul style="list-style-type: none"> ➤ Descriptive statistics ➤ inferential statistics 	<ul style="list-style-type: none"> ➤ Descriptive statistics ➤ Regression analysis
To identify critical factors influencing the sustainability of borehole water projects in Tigania West Subcounty in	Sustainability of borehole water projects	Accessibility and availability of clean water and sanitation services. The number of water booths and disinfection blocks. Income gathered from	<ul style="list-style-type: none"> ➤ Descriptive statistics ➤ inferential statistics 	<ul style="list-style-type: none"> ➤ Descriptive statistics ➤ Regression analysis

Meru County, Kenya.		the activities. Adherence to project quality and standards		
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CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, AND INTERPRETATION

4.1 Introduction

The research project findings on the beneficiary-driven implementation and sustainability of the borehole water projects in Tigania West sub-county, Meru County, Kenya, are discussed in this chapter along with data analysis, interpretations, presentations of the primary data collected, and discussions of the findings. Tables and charts were used for the presentations of the results from the data analysis.

4.1 Respondents' Response Rate

According to the estimated sample size, a total of 427 questionnaires were distributed throughout the five wards, encompassing the twelve borehole water projects. Physically and online questionnaires were completed, and responses were obtained for 416 of them. Although a 100% return rate was the study's goal, it was not attained.

Table 4:1 Respondents' response rate

Response	Frequency	Percentages
Number Returned	416	97.4
Number Not Returned	11	2.6
Total	427	100

Table 4.1 indicates that 97.4% of the respondents completed and submitted their questionnaires. This suggests that the study findings are acceptable, reliable, and representative compared to the results of Mwakazi (2017).

Table 4.2: Sex of the Respondents

The Borehole water projects are operated by both the male and female gender in different capacities. The initial Questionnaire inquiry asked about the gender of the respondents.

Questionnaire Inquiry	Frequency	Percentages
Male	248	59.6
Female	168	40.4
Total	416	100

Two hundred and forty-eight (248) of the respondents to the study, or 59.6%, were men, while one hundred and sixty-eight (168), or 40.4%, were women, according to Table 4.2. This suggests that the management and employees of the borehole water project are well-balanced, as required by Kenya's Constitution, which stipulates that at least one-third of all positions be filled by women.

Table 4.3: Age of the Respondents

Age is central regarding training levels, experience, life exposures, and attributes toward handling different challenges. Respondents were requested to tick their age brackets appropriately.

Age Bracket	Frequency	Percentages
18 -25	52	12.5
26-35	97	23.3
36-45	149	35.8
>45	118	28.4
Total	416	100

Table 4.3 shows that among the respondents, 12.5% were young adults aged between 18-25 years, 23.3% were between 26-35 years, the majority, 35.8% were those between 35-45 years, and the most senior citizens aged 46 years and above were 28.4%. This indicates that most borehole water projects are managed and operated by a mixture of senior youths and those above the youth bracket, making 64.2%.

Table 4.4: Respondents' level of education

Level of educational achievement was sought in this section. Since the study targeted respondents with a better understanding of English and Kiswahili, the Ordinary Level of education was considered the lowest level for participation in the study.

Education Level	Frequency	Percentages
O Level	34	8.2
Certificate/Diploma	167	40.2
Degree	172	41.3
Masters	38	9.1
PhD	5	1.2
Total	416	100

Table 4.4 identifies that most participants had acquired Degrees at 41.3%, followed by Certificates/Diplomas at 40.2%, consuming more than four-fifths of the total workforce and administrative councils. 8.2% had acquired an O level of education, 9.1% had a master's, and only 1.2% had a Ph.D. level. This means that most those involved in managing, controlling, and sustaining the borehole water projects had relevant educational training for successful project implementation and sustainability. The educational data also identifies that 92.8% of the respondents attained post-secondary academic training, thus, were able to respond to the questionnaire appropriately.

Table 4.5: Respondents' Work Experience

The question on the level of work experience was designed to enable the investigator to understand the aspects of respondents' knowledge, attributes clearly, and approaches toward challenges experienced by various borehole water projects.

Work Experience	Frequency	Percentages
Less Than 2 years	181	43.5
2-4 years	136	32.7
More than 4 years	99	23.8

Total	416	100
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Table 4.5 shows that the majority of the participants consisting of 43.5%, had less than 2 years of work experience with the borehole water projects, followed by those who had between 2-4 working years of experience at 32.7%. Those who had more than four years of experience comprised 23.8%.

4.3 Technical capacity and development in the sustainability of borehole water projects

For the crucial understanding of the influence of technical capability and development, this questionnaire section was organized into the availability of expertise, benchmarking, and training beneficiaries to acquire the respondent's understanding. An open-ended option of other technical capacity and development elements also allowed the respondents to mention their thoughts, which were scrutinized and grouped accordingly.

Table 4.6: Technical Capacity and Development

Statement	Percentage					Descriptive	
	5	4	3	2	1	Mean	Std. Dev
There is availability of expertise among the committee officials	29	21	21	22	7	3.43	1.313
Benchmarking helps the management to acquire new skills	10	38	16	24	12	3.10	1.238
There is existence of spare parts	26	19	28	17	10	3.33	1.316
There is scheduled maintenance of the water projects	2	2	2	10	55	1.55	0.776
Composite						2.62	1.158

The study results given in table 4.6 suggested a composite mean of 2.62 of the respondents who determined that technical capacity affect sustainability of borehole water projects in Kenya.

This was corroborated by the study key statements with the majority of the respondents with a mean of 3.43 agreeing that there is availability of competence among the committee officials while a mean of 3.33 agreed that there is presence of spare parts. More so, a mean of 3.10 agreed that benchmarking aids the management to learn new talents. Lastly, only mean score of 1.55 of the respondents strongly disputed that there is scheduled maintenance of the water projects.

4.4 Governance Structures in the sustainability of borehole water projects

To capture this, the study employed four aspects of governance structure: project management committee members and system, Leaders' integrity, Change in leadership, and Transparency and accountability forums. The section also enabled the respondent to mention any other aspect of the governance structure that was not captured in the questionnaire, as presented in table 4.7.

Table 4.7 Governance Structures in the sustainability of borehole water projects

Statement	Percentage					Descriptive	
	5	4	3	2	1	Mea n	Std. Dev
Project management committee members and structure	33	52	12	2	2	4.12	0.818
Leader's integrity influence sustainability of projects	29	31	28	7	5	3.72	1.121
Change of leadership influence sustainability of projects	19	22	40	14	5	3.36	1.103
There is transparency and accountability forums	7	12	40	22	19	2.66	1.132
Composite						3.47	1.044

According to the survey findings shown in table 4.7, a composite mean of 3.47 respondents agreed that project governance had an impact on the sustainability of borehole water projects in Kenya. The majority of respondents, with a mean of 4.12, agreed that there was a project management committee and structure, and a majority, with a mean of 3.72, agreed that a leader's integrity affected a project's sustainability. Again, a

mean of 3.36 had neutral opinion on the statement that change of leadership influence sustainability of projects. A mean of 2.66 had a neutral opinion on the statement that there is transparency and accountability forums.

4.5 Resource mobilization in the sustainability of borehole water projects

The study attempted to figure out the essential aspects of resource mobilization that critically influence the sustenance of borehole water projects. The study provided the respondents with various extents or options to which community participation, availability of local resources, free labor, and accessible materials would implicate the implementation and sustenance of the borehole water projects. Further, the respondents were also enabled to provide other factors linked to resource mobilization that they may have encountered or thought of for enumeration and grouping into relevant ideologies and the results are presented in table 4.8.

Table 4.8: Resource mobilization in the sustainability of borehole water projects

Statement	Percentage					Descriptive	
	5	4	3	2	1	Mean	Std. Dev
There is community contribution towards the project	17	52	19	5	7	3.67	1.049
There are available local resources	19	16	38	14	14	3.14	1.099
Community members offer free labor	33	41	21	3	2	3.12	1.272
There is availability of materials for free, like stones, land	17	40	24	5	14	3.41	1.243
Composite						3.47	1.116

According to the study's findings, which are shown in table 4.8 above, a composite mean of 3.47 respondents in Kenya agreed that resource mobilization has an impact on the sustainability of borehole water projects. This was corroborated by the study's key findings, which showed that the

majority of respondents—with a mean of 3.67—agreed that the community contributed to the project and that people of the community provided free labor. A mean score of 3.41 indicated agreement that free resources, including land and stones, are available. Additionally, the statement that local resources are accessible had a mean score of 3.14, which indicated a neutral opinion.

4.6 Monitoring and Control in the sustainability of borehole water projects

Monitoring and control aspects critically influence the nature of management, sustenance, and implementation of borehole water projects. This was addressed through evaluation of the independent scrutiny of the projects, management supervisory, project reviews, bench marking, project auditing, and post-project evaluation. The respondents were asked to explain how these monitoring and control aspects influence the borehole water project outcomes.

Table 4.9: Monitoring and Control in the sustainability of borehole water projects

Statement	Percentage					Descriptive	
	5	4	3	2	1	Mean	Std. Dev
There is independent scrutiny of projects	12	3	26	34	24	2.45	1.245
There are is management supervisory	17	66	2	14	2	3.83	0.939
There are project reviews	5	10	50	19	16	2.71	1.026
There are project audits	5	14	28	26	29	2.43	1.186
Composite						2.83	1.083

According to the study results shown in table 4.9, a composite mean of 2.83 respondents agreed that monitoring and control measures have an impact on the outcomes of borehole water projects. The majority of respondents, with a mean of 2.45, agreed that there is independent scrutiny of initiatives, which was supported by the study's key findings. This was followed by means of 3.83 and 2.71, who concurred that there are, respectively, management supervisory and project reviews. Additionally, there are project audits, as indicated by the mean ratings of 2.43.

4.10 Correlation Analysis

		Sustainability	Technical capacity	Government structure	Resource mobilization	Monitoring and control
Sustainability	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	416				
Technical capacity	Pearson Correlation	.649**	1			
	Sig. (2-tailed)	.000				
	N	416	416			
Government structure	Pearson Correlation	.607**	.491**	1		
	Sig. (2-tailed)	.000	.000			
	N	416	416	416		
Resource mobilization	Pearson Correlation	.752**	.672**	.626**	1	
	Sig. (2-tailed)	.000	.000	.000		
	N	416	416	416	416	
Monitoring and control	Pearson Correlation	.201	-.335*	.087	.062	1
	Sig. (2-tailed)	.130	.010	.517	.646	
	N	416	416	416	416	416

The correlation matrix displayed show the existence of a positive strong correlation amongst technical capacity and sustainability which implied that a unit increment in

technical capacity leads to increment in the sustainability of borehole water projects by 64.9. Again, there was a positive strong correlation between government structure factor and sustainability of borehole water projects which implied that a unit increment in government structure factor leads to increment in the sustainability by 60.7%.

A positive strong correlation was also observed between resource mobilization and sustainability of borehole water projects which implied that a unit increment in resource mobilization increases the sustainability by 75.2%. However, a positive weak correlation was observed between monitoring and control and sustainability of borehole water projects that implied that a unit increment in monitoring and control increases the sustainability of borehole water projects by 20.1%.

CHAPTER FIVE

SUMMARY OF THE FINDINGS, DISCUSSIONS, AND CONCLUSIONS

5.1 Introduction

This is the final chapter, and it summarizes the findings, discussion, conclusions, and recommendations based on the study outcomes.

5.2 Summary of the research findings

This section presents a significant summary of the study outcomes addressing the study objectives and questions.

5.2.1 Technical Capacity and Development in Sustainability of Borehole water Projects in Tigania West Subcounty

The research project outlines that majority of the borehole water project respondents agreed that the availability and the level of expertise significantly influence the sustainability of these projects. Benchmarking is a crucial factor in sustainability, while 78.8% pointed out that training is critical in successfully implementing and sustaining the borehole water project. From the open-ended question on other technical capacity and development aspects, after a thorough review and scrutiny, availability of the required workforce, review of the working standards and conditions, and the existence of nepotism were mentioned in the ratio of 33.9%, 20.9%, and 22.8% respectively. Benchmarking plays a crucial role in monitoring progress and addressing related challenges that are similar across different regions involved in similar or the same projects. It is essential in providing evidence-based analysis critical for implementing and sustaining borehole water projects, especially in developing countries. The nature of the workforce, working conditions, and nepotism also contribute to sustainability impacts, thus, must be considered critical end-user campaigns.

5.2.2 Governance Structures in the sustainability of borehole water projects in Tigania West Subcounty

The study found that 57.9% of the respondents were convinced that the project management committee members and structure influence sustainability, while 73.5% agreed that leader integrity is relevantly influential in the sustenance of borehole water projects. The majority of the

respondents affirmed that transparency and accountability in leadership and change in administration essentially form the vital governance factors that influence the patterns of sustenance and implementation of the borehole water projects in the Tigania West sub-county. Attributes and leadership patterns are the core determinants of the success rates of most projects since they are involved in the decision-making and management roles. Also mentioned by the respondents as part of the governance structure includes the role of devolution (28.1%), corruption (29.1%), and bureaucracies (23.3%) (figure 5). With most of the respondents concerned with the leadership parameters, Tigania West Subcounty must ensure that sufficient investments are issued to enhance leadership competencies to enable successful initiation and long-term operationalism of the borehole water projects.

5.2.3 Resource mobilization in the sustainability of borehole water projects in Tigania West Subcounty

The research pointed out that 52.9% of the populace believes community participation influences implementation and sustenance. In comparison, 46.4% agreed on the availability of local resources, and 52.6% reviewed that free labor is a crucial aspect of resource mobilization towards addressing challenges in the sustainability of borehole water projects. The study showed that 56.3% of the respondents critically viewed that availability of materials such as land and stones required for implementation and maintenance directly impacts the borehole water project outcomes. Other factors that the end users also mentioned were the nature of the procurement systems (8.9%), corruption (30.5%), and devolution (28.4%). Resource mobilization requires numerous parameters to enhance every project's success rate. Understanding the nature and patterns to which the end user experiences the beneficial instances of resource mobilizations is vital for timely response to the relevant cases. The study findings explain that exploring the available materials and resources while enhancing community participation is appropriate and necessary for the successful implementation and sustainability of the borehole water project.

5.2.4 Monitoring and Control in the sustainability of borehole water projects in the Tigania West sub-county

The study findings showed that 37.7% of the respondents were convinced that individual scrutiny affects sustainability, while 74.5% argued that management supervisory is an essential aspect of monitoring and control in the Tigania West sub-county. On the significance of borehole project

reviews and audits, 73.3% and 56.7% (figure 8) of the respondents, respectively, ascertained that they influence the implementation and sustenance of borehole water projects in the Tigania West sub-county. The impacts of the post-project evaluation were observed among 60.6% of the participants, making it a significant factor of interest. The respondents also mentioned the availability of security systems (34.1%) and insufficient automated equipment (30.3%) as other essential factors in the monitoring and control of sustainability. From the data on monitoring and control, Management supervisory and project reviews were significantly considered as the influential factors of sustainability. Therefore, the local authorities and relevant stakeholders of the borehole water projects in the Tigania West sub-county must ensure that these aspects are sufficiently addressed.

5.2.5 The Sustainability Trend of borehole water projects in the Tigania West sub-county

This research project established that 46.6% of the respondents agreed that there had been observable developments and improvements in the accessibility and availability of clean water from the borehole water projects. According to the findings in figure 11, 27.4% accepted that the number of borehole water projects has increased in the Tigania West sub-county. Regarding adherence to the initial project quality and standards, 32.2% of the respondents acknowledged this existence. However, 35.6% of the respondents felt that the end users or the beneficiaries had been involved in the implementation and sustainability of the borehole project, leaving more than two third of the population unaware of the importance of sustainability requirements.

5.3 Discussions of the Findings

Generally, most of the highlighted factors have been considered by the respondents as influential aspects that determine the level of implementation and sustainability of borehole water projects in the Tigania West sub-county. The study population captured were educated working individuals with a significant experience in the implementation process and mechanisms of sustainability required in borehole water projects. Therefore, this section of the research project provides a comparative summary of the study findings and the existing sphere of knowledge in the area of research.

5.3.1 Technical Capacity and Development in Sustainability of Borehole water Projects in Tigania West Subcounty

The study established that, on average, 67.2% of the educated and working members in the Tigania West sub-county agreed that technical capacity and development are critical components to consider during the implementation and sustainability of borehole water projects. The study findings agree with Abraham's (2019) study conducted in Turkana, where 78.2% of the respondents identified training as an essential factor in the sustainability of water projects, and more than half identified expertise as a significant aspect (Abraham, 2019). While the sustainability of borehole water projects remains a challenge in most developing countries, understanding these challenges from the end user perspective is crucial. Continuous functionality of these projects must always consider proper training and availability of the expertise for repairs and maintenance and consider benchmarking of successful borehole projects in every project step. The study also identified that the availability of the workforce and appropriate working conditions of the borehole staff promotes the successful sustainability of the project; this can be attributed to staff motivation. Nepotism was also mentioned in the study as it negatively impacts the processes of implementation and sustenance of the borehole projects, causing the influx of individuals with insufficient expertise and relevant training.

5.3.2 Governance Structures in the sustainability of borehole water projects in Tigania West Subcounty

Good governance provides efficient and effective leadership competencies and skills that enhance decision-making, integrity, transparency, and accountability. The study's finding indicates that 86% of Tigania West sub-county residents reported that various attributes of leadership and change in leadership are core influences that determine the performance of borehole projects before, during, and after the implementation process (figure 4). This is in line with the findings of Ntoiti and Makau (2022), whose statistical report portrayed that 82.2% of the respondents indicated that strategic leadership and leadership efficiency hugely impact organizational performance (Ntoiti & Makau, 2022). Leaders coordinate the management roles, staff selection, project initiation, and project sustainability at different levels of operations. The study thus established that the end users understand the critical role of governance structure in the appropriate implementation and sustenance of borehole water projects. The water and Irrigation department is a devolved function

of the county government, and the study pointed out that only 28.1% understand the role of county government in borehole project sustainability.

5.3.3 Resource mobilization in the sustainability of borehole water projects in Tigania West Subcounty

Resource allocation and mobilization are central in the implementation, maintenance, and long-term existence of borehole water projects. The study established that more than half of the population is less informed about their role in mobilizing resources for different projects. Most of the local resources in the Tigania West sub-county remain insufficiently explored, which is indicated by the 53.6% of the respondents who are unaware of the essential local resources required for the implementation of the borehole water projects. The Study determined that 52.6% of the Tigania west residents believe in providing free labor to reduce the labor gap required for the sustainability of most projects. This is in agreement with the Meru County Integrated Development Plan 2018-2022, which presented an increasing number of Volunteers, students on attachments, and interns to sufficiently eliminate labor and training deficiencies within the county. Also similar to the integrated development plan in the level of community contribution towards borehole water projects, the findings stood at 52.9% of the population. Other factors mentioned in the study include corruption, devolution extent, and procurement system as essential modules of resource mobilization. These significantly determine when, where, and how the relevant materials for implementation and sustainability are influenced.

5.3.4 Monitoring and Control in the sustainability of borehole water projects in the Tigania West sub-county

The reported findings indicated that management supervisory as an aspect of monitoring and control was the most identified (74.5%) as an influential factor of implementation and sustainability. The study established that project reviews and post-project evaluations positively contribute to the relevant elements of borehole project implementation and sustainability. This reciprocates Atheru and Ngige (2021) findings that although spiritual advocacy is vital, supervised management, project evaluations, and reviews play a critical role in understanding the

patterns and mechanisms of borehole water project processes and sustenance (Atheru, Gichohi, & Ngige, 2021). This research project also demonstrated that establishing security systems and incorporating automated equipment are required to reduce unplanned breakdowns and inefficient functionality. Solving the rising levels of borehole pump breakdown requires user-friendly mechanical pumps.

5.3.5 The Sustainability Trend of borehole water projects in the Tigania West sub-county

The study found that, on average, 35.5% of the respondents believed there had been positive progress in the sustainability trend of borehole water projects in the Tigania West sub-county. Regarding end-user involvement, 35.6% of the respondents agreed that there is a significant improvement in participation in borehole water project activities. The study results agree with Abraham (2019), who presented that beneficiary participation remains insignificant as most locals identified that most water projects do not operate to support their ideologies (Abraham, 2019). According to the findings, most respondents presented that the sustainability trend of borehole water projects is lagging due to several factors. It is, therefore, crucial for the implementors of the borehole water projects to involve the beneficiaries in every process to achieve its long-term existence and functionality.

5.4 Conclusions

The study identified that different aspects of technical capacity and development, governance structure, resource mobilization, and monitoring and control significantly contribute to the performance of borehole water projects in terms of implementation and sustainability. The study also identified below-average sustainability trends in the borehole water project, limiting the alleviation of water scarcity and related impacts. The existence of corruption and the critical role of devolution was consistently mentioned as the vital factors that predominantly affect the borehole water project implementation and sustainability processes. To successfully implement and sustain borehole water projects, it is essential to actively involve the beneficiaries and other stakeholders participating in community development.

5.5 Recommendations

Based on the study findings, the investigator recommends the following:

- a. The county government of Meru should ensure that effective leadership and appropriate governance structure are provided to ensure the borehole projects' sustainability.
- b. The Ministry of Water and Irrigation department should provide relevant training and expertise to educate the administrative councils and staff on borehole water projects.
- c. The local and community leadership must ensure sufficient community engagement in significant projects that directly influences their daily lives.
- d. The county government of Meru should ensure that sufficient exploration of the existing local resources for use in community-based projects.
- e. Investors should consider the application of technology and modern equipment for the successful implementation and sustainability of borehole projects.
- f. Further future research should be carried out on the links between sustainability and beneficiaries on water projects in Kenya for more recommendations.

5.6 Suggestions for further study

The study investigated beneficiary-driven implementation and sustainability of borehole water projects in Kenya: a case of Tigania west subcounty in Meru County. Considering that there are other numerous vital factors that have the potential to affect sustainability of borehole water projects in Kenya and better understand project management, future studies should be done to a larger population in the other counties in Kenya for comparative purposes.

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Appendix II: Research Questionnaire

You are requested to fill out your personal information in the spaces below. Please tick only one response. The study seeks to establish the **RELATIONSHIP BETWEEN BENEFICIARY DRIVEN IMPLEMENTATION AND SUSTAINABILITY OF BOREHOLE WATER PROJECTS IN KENYA: A CASE OF TIGANIA WEST SUB COUNTY IN MERU COUNTY.**

SECTION A: Background Information1

1. What is your gender

Male: Female:

2. Indicate your age bracket

18-25 yrs. 26-35yrs.

36-45yrs. 46 and above yrs.

3. State your highest level of education

'O' Level Certificate/Diploma Degree Masters Ph.D.

4. How long have you worked with borehole water projects in Tigania West Subcounty in Meru County, Kenya?

Less than 2 years Between 2 and 4 years More than 5 years

SECTION B: BENEFICIARY-DRIVEN IMPLEMENTATION AND SUSTAINABILITY OF BOREHOLE WATER PROJECTS IN KENYA: A CASE OF TIGANIA WEST SUBCOUNTY IN MERU COUNTY.

Technical capacity and development

1. Please indicate the extent to which the following aspects of technical capacity and development determine the sustainability of borehole water projects in Tigania West Subcounty in Meru County, Kenya, using the scale: 5- Very Great Extent, 4-Great Extent, 3-Moderate Extent, 2-Low Extent, 1- No Extent

	1	2	3	4	5
Availability of expertise					
Benchmarking					
Training Beneficiaries					

2. In your opinion, what other aspects of technical capacity and development should borehole water projects in Tigania West Subcounty in Meru County, Kenya adopt to improve their sustainability?

.....

Governance Structures

3. Please indicate the extent to which the following aspects of governance structures determine the sustainability of borehole water projects in Tigania West Subcounty in Meru County, Kenya. Where: 5- Very Great Extent, 4-Great Extent, 3-Moderate Extent, 2-Low Extent, 1- No Extent

	1	2	3	4	5
Project management committee members and structure					
Leader’s integrity					
Change of leadership					
Transparency and accountability forums					

4. In your opinion, what other aspects of governance structures should borehole water projects in Tigania West Subcounty in Meru County, Kenya adopt to improve their sustainability?

.....

Resource mobilization

5. Please indicate how the following aspects of resource mobilization determine the sustainability of borehole water projects in Tigania West Subcounty in Meru County, Kenya. Where: 5- Very Great Extent, 4-Great Extent, 3-Moderate Extent, 2-Low Extent, 1- No Extent

	1	2	3	4	5
Community contribution					
Local resources					
Free labor					
Availability of materials for free, like stones, land					

6. In your opinion, what other aspects of resource mobilization should borehole water projects in Tigania West Subcounty in Meru County, Kenya adopt to improve their sustainability?

.....

.....

.....

Monitoring and Control

7. Please indicate the extent to which the monitoring and control aspects determine the sustainability of borehole water projects in Tigania West Subcounty in Meru County, Kenya. Where: 5- Very Great Extent, 4-Great Extent, 3-Moderate Extent, 2-Low Extent, 1- No Extent

	1	2	3	4	5
Independent scrutiny of projects					
Management supervisory					
Project reviews					
Benchmarking exercises					
Project audits					
Post project evaluations					

8. In your opinion, what other monitoring and control aspects should borehole water projects in Tigania West Subcounty in Meru County, Kenya adopt to improve their sustainability?

.....

.....

.....

Sustainability of Borehole Water Projects

9. What is the sustainability trend of borehole water projects in Tigania West Subcounty in Meru County, Kenya, over five years concerning the following aspects? Where: Strongly Agree (5); Agree (4); Neutral (3); Disagree (2) and Strongly Disagree (1)

	Strongly Agree	Agree	Neutral	Decreasing	Strongly Disagree
Availability and accessibility of clean water					
Number of water boreholes					
Involvement of the End User					
Adherence to project quality & standards					

THANK YOU

Appendix III: DEMOGRAPHY OF THE RESPONDENTS

Case	Age	Male	Female	Overall	
1	18 - 25	24	28	52	
2	26 - 35	58	39	97	
3	36 - 45	105	44	149	
4	46+	81	57	118	
5					

Figure 2: Presentation of the respondents' level of education

Case	Education	Male	Female	Overall	
1	O Level	23	11	134	
2	Cert/Dipp	103	64	167	
3	Degree	90	82	172	
4	Masters	28	10	38	
5	PHD	4	1	5	
6					

Figure 3: Presentation of the respondents' work experience

Case	Work_Experience	Male	Female	Overall	
1	<= 2 years	115	66	181	
2	2 - 4 years	49	87	136	
3	5+ years	84	15	99	
4					

Appendix VI: Factors influencing implementation and sustainability

Figure 4: Result set summary on technical capacity and development

Case	Metric	I	II	III	IV	V	Average_S	
1	Expertise	7	28	102	157	122	3.80	
2	Benchmarking	4	10	145	129	128	3.88	
3	Training	8	7	73	141	187	4.12	
4								

Figure 5: Result set summary on the governance structure

Case	Metric	I	II	III	IV	V	Average_S
1	Project Management Structure	11	29	135	143	98	3.69
2	Leaders and Integrity	0	18	92	129	177	4.12
3	Change in Leadership	4	19	4	156	233	4.43
4	Transparency and accountability	1	1	216	176	212	3.78
5							

Figure 6: Result set Summary on Resource Mobilization

Case	Metric	I	II	III	IV	V	Average_S
1	Community Contribution	2	11	183	112	108	3.75
2	Local Resources	1	8	214	100	93	3.66
3	Free Labour	10	77	111	114	105	3.55
4	Availability of materials	7	57	118	123	113	3.68
5							

Figure 7: Result set Summary on Monitoring and Control

Case	Metric	I	II	III	IV	V	Average_S
1	Independent Scrutiny of projects	19	121	119	102	55	3.13
2	Management Supervisory	7	45	54	128	182	4.04
3	Project Reviews	2	25	85	161	144	3.28
4	Benchmarking Exercises	0	32	223	89	72	3.48
5	Project audits	6	58	116	135	101	3.64
6	Post project evaluations	8	36	120	137	115	3.76
7							

APPENDIX IV: TRANSMITTAL LETTER



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Our Ref: L50/36716/2020

October 6, 2022

TO WHOM IT MAY CONCERN

INTRODUCTION LETTER- ELIZABETH MATIKO CHACHA

The above named is a registered Masters' of Arts in project planning and Management student at the University of Nairobi, Faculty of Business and Management Sciences. She is conducting research on "**Beneficiary Driven Implementation and Sustainability of Borehole Water Projects in Kenya: A Case of Tigania West Sub County in Meru County**".

The purpose of this letter is to kindly request you to assist and facilitate the student with necessary data which forms an integral part of the thesis.

The information and data required is needed for academic purposes only and will be treated in **Strict-Confidence**.





Your co-operation will be highly appreciated.

Handwritten signature of Dr. Joshua Wanjare in black ink.

Dr. Joshua Wanjare
Associate Dean,
Faculty of Business and Management Sciences

PM/pgr

APPENDIX V: RESEARCH PERMIT

 REPUBLIC OF KENYA	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 275416	Date of Issue: 19/October/2022
RESEARCH LICENSE	
	
This is to Certify that Miss.. ELIZABETH MATIKO CHACHA of University of Nairobi, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Meru on the topic: BENEFICIARY-DRIVEN IMPLEMENTATION AND SUSTAINABILITY OF BOREHOLE WATER PROJECTS IN KENYA: A CASE OF TIGANIA WEST SUBCOUNTY IN MERU COUNTY for the period ending : 19/October/2023.	
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