COMMUNITY PARTICIPATION AND SUSTAINABILITY OF WATER PROJECTS IN NAROK SOUTH SUB-COUNTY, KENYA

BY

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DECLARATION

Declaration by Candidate

This thesis is my original work and has not been presented for examination in any other university. No part of this work may be reproduced without the author and/ or Moi University's prior permission.

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DEDICATIONS

I dedicate this research to my beloved wife Florence Langat and my little king Pharrell Kibet, my parents Eric Bett and Nancy Bett, my siblings, my classmates, and friends who have been a great inspiration to my academic journey. Your love, sacrifice, unfailing support, and continuous encouragement through the period of study and writing this research inspired me, and you were my driving forces when the times got rough.

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ABSTRACT

Sustainability is a crucial success factor in any development project. In strive to achieve project sustainability, various water reforms have been established by both governments and development partners globally with an aim of ensuring sustainability of water projects. However, despite these initiatives, a high rate of community water project failure still exists. It is against this background that the study sought to establish the influence of community participation on the sustainability of water projects. The specific objectives were to determine how community participation in decision making influence sustainability; assess how community participation in labor provision influence sustainability; establish the influence of community participation in non-financial contribution on sustainability; examine the influence of community participation in financial contribution on sustainability of water projects in Narok South Sub-County, Kenya. The study was informed by Asset Based Community Development (ABCD) model. A quantitative research approach was used, and the study adopted an explanatory research design. The target population was 15,500 project beneficiaries drawn from Narok South Sub- County. A sample of 384 was selected through random sampling frame using Cochran's sample size determination formula across the ten water projects in Narok South Sub-County. Out of 384 respondents contacted, 322 responded to the questionnaires making an 83.85% return rate. Quantitative data was gathered using questionnaires, and descriptive data were analyzed using means, percentages, and standard deviations, while inferential data were analyzed using regression analysis (R^2) and Pearson's product-moment correlation (r) to determine the strength and direction of the relationships between independent and dependent variables. The study established a significant influence at ($p<0.05$) of community participation in labor provision ($\beta_4=0.495$, $p=0.0001$), provision of non-financial materials ($\beta_4=0.533$, $p=0.0001$), and financial contribution ($\beta4=0.300$, $p=0.0001$). However, it was found that there is negative effect of community participation in decision making ($\beta_4=-0.022$, $p=0.665$), on sustainability of water projects. Overall, there is a positive and significant effect between community participation ($R=0.675a$) and sustainability of community water projects in Narok South Sub- County. The study's R^2 value was 0.456 which means that community participation in decision-making, labor provision, the contribution of non-financial materials, and financial provision accounted for 45.6% of the total variance in community water projects' sustainability. The study concluded that community participation in labor, non-financial and financial contribution had positive and significant influence on sustainability of community water projects, and joint influence with participation in decision. It is therefore recommended that, to enhance sustainability of water projects, beneficiaries should participate in all stages of the projects and contribute in labor, financial and non-financial resources towards the project which conforms with the provision of ABCD model. Thus, policy makers should incorporate community participation initiatives in formulation of policies regarding water projects.

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OPERATIONALIZATION OF TERMS

Participation in Decision Making: This kind of participation involves project beneficiaries taking an active role in project design, project decisions, consultations, and choosing their representatives.

Participation in Financial Contributions: This is the contribution of the financial resources by the beneficiaries to cover administration, contingency, operational, and maintenance costs.

Participation in Labor Provision: Community participation in labor contribution involves project beneficiary involvement in paid and unpaid labor during project site clearing, transportation of construction materials, and construction of the civil works.

Participation in Non-Financial Contribution: Community participation in non-financial provision includes the contribution of non-financial materials involves beneficiaries pooling together the locally available non-financial resources to support operation and maintenance of the project. These resources materials include; donation of land where the project is constructed, the contribution of fencing materials to protect the project, construction materials such as sand, gravel,

stones and, grant of tools and equipment that can be used to remove silts in water projects.

Participation in Water Projects: Community participation in water projects involves engaging water project beneficiaries in; Decision making, provision of financial support, the contribution of non-financial materials, and labor contribution.

Sustainability of Water Projects: This is a situation whereby community water projects portray the following features; sufficient quantity and good quality of water, continual project operations, willingness to pay among beneficiaries, and maintenance and financial independence.

ACRONYMS

ABCD	Asset-Based Community Development
ASALs	Arid and Semi-Arid Lands
ENSDA	Ewaso Ngiro South Development Authority
CP	Community Participation
ICWE	International Conference on Water and the Environment
IGA	Income Generating Activity
JCIA	Japan International Corporation Agency
MDG	Millennium Development Goals
PRA	Participatory Rural Appraisal
SDGs	Sustainable Development Goals
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations International Children's Emergency Fund
WASH	Water Supply, Sanitation, and Hygiene
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter consist of background to the study, statement of the problem, the purpose of the study, objectives, hypotheses, significance of the study, and the study's scope.

1.2 Background of the Study

Sustainability refers to the capacity of any system to be healthy and endure over the long term. Concerning development projects, it means that benefits are realized, maintained, and continues even after the donor funds have been withdrawn and the project handed over to the beneficiaries (Nyakwa, Muronga, and Muvumbi, 2018). UNDP established that most projects implemented at a community level were not being sustained on a global scale, making their implementation costs not commensurate to the benefits acquired from these projects (UNDP, 2010). Though there is no definite time limit attached, sustainability is about the functionality of projects over time.

In water supply, sanitation, and hygiene (WASH) services, several water projects have been implemented but face a sustainability challenge. Despite the Millennium Development Goal (MDG) establishment in the year 2000 to reduce the percentage of people lacking access to sustainable, safe drinking water by 2015, most regions worldwide have not achieved these goals (World Economic Forum, 2015: World Bank, 2018). World Health Organization (WHO) and United Nations International Children's Emergency Fund UNICEF, (2015), reported that most water projects fail to operate to optimum level or collapses immediately when the donor funds are withdrawn in most countries globally. Additionally, World Health Organization (WHO) revealed that limited or lack of access to WASH services negatively affects communities' health, education, work efficiency, and labor productivity, to name a few (Harlin and Kjellén,

2015; UN-Water, 2015; WHO, 2020). The water shortage problem has been further witnessed during the Covid-19 pandemic that has left communities lacking enough water supply more vulnerable.

Various studies have been undertaken worldwide, seeking to establish the relationship between community participation and community water projects' sustainability. According to Davis, Meyer, Singh, Wright, & Zykofsky (2013), the problem of low suitability in community-based water projects is due to a low level of community participation in their entire project cycle. This issue brings attention to the concept of community participation, which has been at the center of discussion in global development forums. The World Bank sectoral policy paper of 1975 highlighted the importance of community participation in rural development. The paper argues that participation gives ordinary citizens a democratic chance to participate in making decisions that affect their livelihoods (World Bank, 1975). Commonly community participation is the community's active involvement in creating and implementing the development initiatives in all levels and forms of political and socio-economic activities.

Water is an essential commodity on earth, yet globally there is a considerable gap between its demand and supply. According to the United Nations report (2015), it is estimated that the world will experience a 40% water deficit by 2030, and by 2050 global economy will incur an estimated $500 billion on water insecurity (UN-Water, 2016). On a worldwide scale, more than 844 million people with the largest proportion from Sub-Saharan Africa- by 2018 lacked access to clean water, which is critical for good health, social and economic development (World Health Organization, 2018). From this discussion, it is evident that water demand and supply gap will only increase, calling for means to improve community access to water.

Water shortage has been a significant problem for most of the continents. The various initiative has been established to solve this problem, one of them being the International Conference on Water and the Environment (19) in Dublin which formulated the Dublin principles. The Dublin principles provided that water is a finite and vulnerable economic good crucial to sustaining life, development, and the environment. Nyandoro (2020) also opined that water should be treated as an economic commodity because it has a monetary value among all of its competing uses. Additionally, ICWE recognized the role that women play in safeguarding and managing water sources. Therefore, they recommended a shift from a top-down development approach of delivering community water projects to a participatory and sustainable system that recognizes various inputs from the community members (ICWE, 1992).

World Bank report of 2013 attributed water shortage to lack of sustainability among community water projects (World Bank, 2013). Sustainability of water projects is also highlighted by the United Nations Sustainable Development Goals (SDGs), agenda number six, as a critical way on how to achieve social and economic development plans. Water is embedded among most other SDGs, especially those about food, energy and the environment, hence calling for attention to various ways of attaining sustainable water supply (Ait-Kadi, 2016). The water's SDG agenda recommended supporting and strengthening community participation to enhance water and sanitation projects' sustainability.

African countries face the most significant challenge in ensuring the sustainability of water projects. A joint monitoring program by WHO/UNICEF indicates that SDGs are unlikely to be achieved due to a high failure rate among community water projects in Africa (UNICEF/WHO, 2015). The report further depicts that only about 52% of the rural communities in Africa can access drinking water. Additionally, there is a high

water project failure rate among the Arid and Semi-Arid Lands (ASALs) of Africa. These projects fail immediately they are handed over or prematurely terminated after proving to be unsustainable (World Bank, 2013). From this observation, it is of great concern for leaders and community development partners to devise methods for improving water projects sustainability in all sectors.

In sub- Saharan Africa, about 19 percent of the population depend on surface water for domestic chores, and about 75 percent of this population being rural communities. Although about 90 percent in Latin America and the Caribbean are accessed to improved water supply sources, the population in Sub-Saharan Africa is projected to be approximately 61% percent. There is also a difference in the way urban and rural areas use drinking water sources with about 83 percent in urban areas and approximately 61 percent. Regarding MDGs on water supply, a report by WHO in 2015 indicated that only 19 countries in Sub-Saharan Africa were on good cause towards meeting MDGs' on drinking-water and sanitation target (UNICEF and WHO, 2012). From this observation, it can be noted that almost all the countries in Sub-Saharan Africa still have high deficit in clean supply and lack access to improved drinking water.

In Kenya, SDGs are part of Vision 2030 sustainable development agenda, which calls for inclusive access to drinking-water and enhances water supply schemes across all sectors in a sustainable manner (WHO Report, 2017). Despite the Kenyan constitution's provision promulgated in (2010), making water an essential commodity, most communities are still unable to access clean water. Although the government has partnered with development partners to construct rural-based water projects, they are still far behind in terms of MDGs (World Health Organization, 2018). A World Bank (2018) study on rural water supply projects found that up to 25% of rural water initiatives fail within five years upon initiation in Kenya. Behrens-Shah (2016),

similarly, in an ex-post assessment report, established that 59% of water supply systems were unsustainable due to design and maintenance problems. These findings mean that despite huge expenditure on community water projects by both national and county governments to increase community access to water, most of the completed projects have either stopped operating or are not functioning optimally, calling on ways to improve their sustainability.

Water scarcity has been the biggest challenge among the Arid and Semi-Arid Lands (ASALs) in Kenya. One such area is Narok County, which is frequently faced with extreme water scarcity despite having several water projects (ENSDA, 2016: Achieno and Mwangangi, 2018). This county is endowed with several water projects, including water pans, dams, boreholes, and water springs that once supplied the households in Narok, particularly Narok south sub-county, but have since become dilapidated because local communities were not involved in all project management phases (ENSDA, 2017). As a result of low water project sustainability, Narok was ranked last in terms of access to clean water among the 47 counties (Kenya County Fact Sheet, 2013). WHO, (2013) indicated that about 33% of residents in Narok had access to save community water supply. This observation depicts a need for water improvement and sustainability strategies in Narok County to enhance comprehensive water access among its residents.

1.3 Statement of the Problem

Water project sustainability has been of great concern to most nations on a global scale. The majority of established water projects face high failure rates and have resulted in various local and international strategies to address the issue (UNDP, 2019). Among the strategies is recognizing water as an economic resource and incorporating a participatory approach to the construction and management of water projects proposed

by ICWE (1992). In Kenya, various policy reforms have been formulated at the national and county levels to address sustainability. The 2002 water act incorporated ICWE strategies and has significantly improved access to water by most local communities. However, like many other developing nations, these strategies have not successfully yielded water projects' sustainability.

For several years in Narok South Sub-County, multiple government agencies and donors have invested a substantial resource in constructing community water projects to curb the increasing impact of climate change. Despite these efforts, most residents still lack access to clean water because most of the projects failed to operate within three or fewer years after commissioning (UNICEF, 2012). CRA (2013); KNBS (2017) reported that the performance of water projects in Narok was abysmal compared to other counties. WASREB (2019) annual performance report indicated that Narok county had less than 30% accessibility of clean water. These observations show a problem with the sustainability of community water projects in Narok South Sub-County.

According to the Asset Based Community Development (ABCD) Model by Kretzmann and McKnight (1996), the community's active and equal partner involvement in the entire project management phases is critical to its success. This model asserts that every person has capacities, abilities, and gifts that can be pulled together to achieve community development objectives collectively. Augustino (2015) further opined that when community members participate in all project lifecycles, a sense of ownership is built, enhancing community water projects' sustainability. This means that project beneficiaries' participation is essential in achieving project sustainability of community based water projects in Narok South Sub-County.

However, in Narok South Sub-County, most water projects were established using the top-down approach, where little or no contribution of the community beneficiaries was observed. ENSDA (2017) reported that 200 water projects were found with minimal participation of the communities. There is evidence that in situations where community participation is low, water supply outstrips the supply due to inadequate project sustainability.

Although various scholars have attempted to study the link between community participation and different project performance indicators, the empirical literature has shown that there is lack of consensus among the findings obtained (Kaliba, (2002), Marks, Komives and Davis, (2014), Muniu, Gakuu and Rambo, (2017), Kilonzo, and George, (2017), Achieno and Mwangangi, (2018), Nyakwaka, Muronga, and Muvumbi, (2019). None of the studies have tried to establish the cause-effect relationship between participation in decision making, labor provision, provision of non-financial, and financial contribution to addressing the gap of knowledge on low water project sustainability. Hence, it is imperative that a study on how community participation can be an intervention measure to ensure community water projects' sustainability. Therefore, this study desired to examine how sustainability of community-based water projects is influenced by the participation of the beneficiaries of water projects in Narok South Sub-County, Kenya, to attain SDG number six of ensuring clean drinking-water and sanitation target.

1.4 Purpose of the Study

The study aimed to determine the influence of community participation in; decision making, labor provision, the contribution of non-financial, and financial provision on the sustainability of water projects in Narok South Sub-county Narok, Kenya.

1.5 Objectives

The study sought to achieve the following objectives:

i. To determine the influence of participation in decision-making on water projects' sustainability in Narok South sub-county in Narok county, Kenya.
ii. To assess the influence of labour contribution on sustainability of water projects in Narok South sub-county in Narok county, Kenya
iii. To establish the influence of non-financial resource contribution on sustainability of water projects in Narok South sub-county in Narok county, Kenya
iv. To evaluate the influence of financial resource contribution on sustainability of water projects in Narok South sub-county in Narok county, Kenya

1.6 Hypotheses

The following hypotheses were tested:

i. **H_{01}**: Decision-making by community members has no significant influence on the sustainability of water projects in Narok South sub-county in Narok County, Kenya.
ii. **H_{02}**: Labour contribution by community members has no significant influence on the sustainability of water projects in Narok South sub-county in Narok County, Kenya.
iii. **H_{03}**: Non-Financial contribution by community members has no significant influence on the sustainability of water projects in Narok South sub-county in Narok County, Kenya.

iv. **H_{04}**: Financial contribution by community members has no significant influence on the sustainability of water projects in Narok South sub-county in Narok County, Kenya.

1.7 Significance of the Study

This study is useful on providing empirical data to scholars on the relationship between community participation and sustainability of community water projects hence building body of knowledge. Additionally, the study will be useful in recommending practical sustainable strategies to be applied during water project implementations by engaging the communities. The study also aims at identifying the existing gaps and opportunities that can be utilized to achieve successful implementation of water projects in ASAL areas.

It also challenges other scholars to further engage in more studies on policy and theory development that incorporate the moderating influence of 'community dependency syndrome' on community participation and entice future scholars to look into Public-Private Partnership (PPP) in community-based water projects.

1.8 Scope of the Study

The study was carried out in Narok South Sub-County to investigate the effects of community participation, including participation in decision making, labor contribution, local resource contribution, and financial contribution on water projects' sustainability. The study targeted ten water projects that included Boreholes, water pans, dams, and water supply schemes. The ten water projects included; Emagutian, Enkosamai, Leshuta, Lekanga, MorijoLoita, Maji Moto, NarosuraNtuka, Ole Mesutie, olololoitikoshi, and Ololunga water projects. The study was delimited to these water

projects because they are the top ten water projects serving about fifteen thousand beneficiaries, according to Narok Water Service Board (2019).

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents literature review related to the study based on thematic and sub thematic areas in line with the study objectives. It also highlights the theoretical and conceptual framework against which the study will be based and a summary of the literature reviewed.

2.2 Concepts

This section highlights the concepts of project sustainability and community participation.

2.2.1 Sustainability of Community Water Projects.

The concept of sustainability is derived from the sustainable development debate. This debate can be traced back to around 1983 and was started by the UN General Assembly with the aim of designing a global program for change. The phrase ‘sustainable development’ refers to the current generation's ability to utilize resources in a manner that is socially, economically and environmentally acceptable (Lencha, 2012). In this essence, sustainability is best explained by the resilience concept, which means the flexibility of a system to dynamic conditions with the features such as the ability to overcome any harsh situations. In water projects, sustainability means the project can offer the same quantity and quality of water during all weather conditions and remain within the same state, with a capacity of self- reorganizing (Brown, and Williams, 2015). Project sustainability is anchored mainly in three aspects: social, economic, and environmental. Therefore, managing resources in a sustainable manner enables communities to utilize resources, hence being considerate of the future generations

Although there is no definite time specified, sustainability means continued functionality of the project over time. In water projects, it means continual gain that results in a long-lasting change to society (Alelah and Mueke, 2015). A sustainable project can withstand challenging conditions and even can improve and embrace changes within its environment (Jansz, 2011). Enduring benefits in rural water services sums up to sustainability; it indicates services other than technology, resulting in adaptation to dynamic financial, economic, and environmental conditions.

In 1987, the Brundtland Report formed the primary source of the concept of a sustainably developed universe. The concept implies the temporal process and an approach to developing and holistically exploiting natural resources. It is thus the core principle that facilitates the attainability of the goals of development while at the same time sustaining the capacity to acquire natural resources from the natural systems and the ecosystem services (Bakermeyer et al., 2014). These are the central systems that form the bedrock of the development of the economy and society. As such, the main idea of sustainable development is to satisfy the developmental needs of the present generations while preserving the ability to meet future generations' needs.

The concept of sustainable development is achieved by setting specific development goals for exploiting resources in a hospitable manner. These goals are referred to as Sustainable Development Goals (SDG). However, water is an essential element in meeting sustainable development goals. According to the World Economic Forum Global Crisis reports, water has been ranked as the first threat to the success and well-being of societies around the world (Shemie et al., 2016). Therefore, there is a great need to ensure that every community has access to clean water to meet development goals. This discussion focuses on establishing the existing link between sustainable development and sustaining the community water projects.

Community development project sustainability happens when the beneficiaries take responsibility to ensure both present, and future generations benefit from the project by sustaining its resources, processes, outcome, and human capacity (Augustino, 2015). The beneficiaries are responsible for ensuring that the water sources are not exploited but naturally replenished, maintaining the facilities to ensure continuous water supply over a prolonged period in a cost-effective manner.

There exists a significant link between sustainable development and water. Most of the communities in the world lack access to clean water for domestic and commercial use. Water is, however, the fuel of growth and development. The demand and need for freshwater are rising at a high rate, increasing the competition and water stress within the international and local community levels around the world (Barkemeyer et al., 2014). The rising crisis related to water in the world leads to deep concerns regarding the aspect of sustainable development. The most suitable solution to the problem that had led to serious concerns is the ability to maintain and sustain water projects within communities to fuel and propel sustainable development.

According to an agency based in Swiss, the management and sustenance of water projects at the community level cannot be achieved through the efforts of a single entity or body. The agency partners with various stakeholders in promoting the Global Program Water (Barkemeyer et al., 2014). The agency's efforts and many others around the world are based on the realization that the ability to ensure that every community can access enough food since the whole community depends on the availability of clean water. Aspects like good health depend on the availability to access clean water free from contamination pollution and the appropriate degrees required. As such, the activities and projects of such organizations are centrally focused on the interventions

toward the various challenges and concerns affecting the management and sustenance of the water resources within the local communities.

The sustainability of water resources is a costly undertaking. For instance, the leakages in water transport systems like underground pipes are very common and frequent due to human activities and other activities. Ensuring that water resources are clean to ensure that people have access to clean water is also very expensive. International organizations like the World Bank and the United Nations act as the primary financiers of such undertakings. Through various agencies, other governments employ funds and resources to maintain water resources (Barkemeyer et al., 2014). However, more funding is required to meet this goal. Simultaneously, partnerships between various stakeholders like the government agencies and private institutions would improve the sustenance of the water projects within communities.

The ability to ensure that water projects are appropriately managed and sustained largely depends on the local communities' education to the effective ways of managing the resources and the degree to which they hold the resources vital to them (Shemie et al., 2016). As such, knowledge of the resources of water and related projects within the community level is indispensable for the agencies and services concerned with hydrology and making related decisions. Having better information and knowledge is the key to protecting the water sources and projects within a community. Similarly, instituting legislation and developing legal frameworks that operate and exist as the watchdogs of managing and sustain water projects. On the other hand, the capacity to formulate and enforce any legal frameworks largely depends on the availability of data and knowledge supporting community water projects.

The primary drivers of change within modern societies are innovation and technology. Similarly, there has been an increasing trend to employ the use of technology as a way to effectively underpin any achievements of sustainable development. The water sector needs not to be left behind in the revolutionary movement. Sustenance of water projects in the communities, therefore, needs more creative and innovative approaches. Recent projects where the aspects of technology in the sustenance of water projects focused primarily on effective monitoring systems (Shemie et al., 2016). The Global Program Water (GPW) has recognized the power of technology and innovation and has thus adopted various strategies as a means of leveraging the pervasiveness of the various technologies in meeting the management needs of water management.

From the above information from literature search, this study points out significant indicators of sustainability of community water projects, these includes; operation level, maintenance level, and management efficiency level. Regarding the level of operation, it implies that the community water project is working in good condition and provides the benefits to all the intended users. This also implies that the infrastructure and the facilities are technically working in good condition, both current and in the near future to provide satisfying color, quantity and quality water within a given accepted distance accessible by all the intended beneficiaries for them to achieve better health care (Muniu, Gakuu and Rambo, 2017).

Another indicator identified by this study, is the level of maintenance of water facilities. For a project to be long lasting, there has to be a preventive maintenance established in place, with the help of non-financial materials such as equipment, construction materials, and other complementary resources that can be utilized in all the stages of the project. Maintenance level of any supply system largely depends on the type and

nature of the technology applied. Also, irregardless of the technology type used, it is important to have a well-structured, resourced, and trained maintenance team in place.

The third indicator of sustainability is the efficiency level of management established. An efficient management ensures that the project resources are used only to achieve the projects goals and objectives. This will include how the management of project resources is conducted, for instance; financial resources and whether the management team are competent, elected from the community members in free and fair manner.

2.2.1.1 Water Quality and Quantity

Water quality broadly refers to analyzing biological, physical, and chemical aspects of water conditions concerning their use standards (Lencha, 2012). Assessing water quality in place of its sustainability is significant as this is the measure of a good ecosystem. The primary water purposes in the project coverage area are domestic usage and farming (Alelah and Mueke, 2015). Despite being a semi-arid area, the region consists of farmers who depend on water to feed animals and irrigation, amongst other farming activities. In that respect, water quality standards in the area should be high.

According to Jansz (2012), water quality is measured using parameters that reflect water quality's leading indicators: water temperature, PH value of water, dissolved oxygen, and nitrogen and phosphorous tests. Ndubi (2015) highlighted the following measures PH and KH testing, water temperature, dissolved oxygen levels, conductivity, salinity, and TDS monitoring. Based on his research in Narok North Sub-county, the PH value of water averaged 7.20 to 8.75 units. Electrical conductivity was 455 to 1145 micro siemens per centimeter, while water temperature ranged from 22.5 to 38.75 degrees Celsius. Also, nitrate levels in water averaged 1.23 to 3.75 mg/l while phosphate levels averaged 0.25 to 3.17 mg/l. lastly, dissolved oxygen levels in the water

were recorded at 3.5 to 5.25 ml/l with 40% to 75% oxygen concentration. Ndubi's findings on dissolved oxygen, water temperature, and PH level recordings averaged slightly higher values than the world health organization's drinking water provisions. The higher values can be attributed to dams, lakes, and water ponds being the primary water sources.

According to Achieno & Mwangangi (2018), Narok County has four permanent rivers, seven permanent springs, eighty four operational boreholes, and slightly over 60 water pans. The primary water sources in the area include River Talek, River Enkarek Narok, River Siyiabei, and River Ewaso Ngiro. Despite the water sources, water scarcity is a common problem, mainly in the suburbs of Narok town and the interiors. However, Narok Water Sewerage Companies has intensified efforts to remedy water shortages by curbing the deficits by embarking on various water projects. Rightly so, the water supply in Narok County has significantly risen over the past year. Currently, the water company supplies over one million cubic meters of water across Narok County.

2.2.1.2 Utilization and Maintenance

It is essential to have a balanced water demand and supply. High level of utilization and maintenance of water projects indicates sustainability of water projects. Utilization means that water drawn from the project has been utilized to serve various purposes before being discarded. Narok County, being at its development stages in water source projects, water scarcity remains extensive, and water utilization and effective maintenance of water projects should remain paramount to ensure sustainability and therefore, proper water utilization techniques should be emphasized (Alelah and Mueke, 2015). Both Governmental and non-Governmental agencies should embark on campaigns to teach the Maa community reasonable water utilization practices. They should emphasize water harvesting in the rainy season by both individuals and the water

agencies. This aims at sparing water produced at the projects for use in the dry seasons. To achieve so, water ponds should also be developed in various areas to harvest rainwater. Additionally, water tanks should be distributed in the communities to assist in the course. The pond maintenance should be conducted annually by repairing breakages and removing silt to ensure maximum storage capacity availability.

2.2.1.3 Financial Independence

One of the indicators of water project sustainability is financial independence, and whether there is an organized source of finance for the project to handle operation and maintenance costs, pay administration expenses, and replacement costs among other contingency costs. A stable source of finances is the most crucial factor in any infrastructural development. In Narok County, water projects are funded by the national government, county government, and foreign donors (Alelah and Mueke, 2015). Being a marginalized county, Narok receives an equalization fund from the national government above half a billion to be used in critical development such as water supply. Furthermore, the county government's annual budgets incorporate water project funding. Grants from international governments and the World Bank also contribute immensely to the development of water sources across Narok County (Achieno & Mwangangi, 2018). Therefore, for a project to be sustainable, it must have in place a financial capacity to keep the project running and dependent on outside sources for their operation and maintenance.

2.2.2 Community Participation

The concept of community participation is very important in development studies. Community participation is the collaboration whereby; people agree voluntarily to partner with externally determined development project by contributing resources, labor and any other incentive in return for expected benefits (Njumwa, 2010). To

achieve community development agenda, it is crucial for the development partner to engage beneficiaries and not doing everything for them, in order to achieve emotional commitment from them (Anderson & McFarlane, 2010). From this observation, it means that community participation gives the beneficiaries sense of ownership in the project. Any contribution the community makes bonds and gives them attention on maintaining and improving operations, because they feel that they were part of the successful completion of the project.

Community participation has been a popularized concept since 1970s as a result from the failures of the top-down approach to community development. It may seem strenuous and procedural but finally, it contributes to successful community development agenda (Fuimaono, 2012). This success is achieved through local knowledge contribution, sense of community ownership, and yielding outputs the meet the perceived needs of the community (Wanyera, 2016). Therefore, communities must sacrifice and take part in community development initiatives. According to Participatory Rural Appraisal (PRA) technique, community development can be achieved through a people centered process. This technique empowers the local communities by including them in problem identification and evaluation process, and also during implementation and post-construction monitoring (Kamble, 2014). It is believed that utilizing participatory from the communities can be achieved when they are given full control in needs assessment, goal-setting, planning, policy-making, implementation and evaluation, among others.

The participatory methods involve various activities, focused upon facilitating the ordinary people to play an active role in development efforts that also allow them to shape their lives. There are therefore various methods and ways in which the participatory development principle is implemented which include; The Participatory

Rural Appraisal (PRA), The Participatory Learning and Action (PLA) and The Rapid Rural Appraisal (RRA).

The Rapid Rural Appraisal (RRA) method consists of semi-structured and rigorously systematic activities focused on the acquisition of research data and can thus be regarded as one of the most effective and rapid research methods. The method was developed as a response to the issues that were associated with structured surveys administered on a large-scale basis. Having been developed in the late 1970s, the method acted to provide alternative techniques with which outsiders would be able to engage with the local people in exploring the issues that they experienced (Chambers, 1994). For instance, the technique was especially effective for scientists who were seeking to carry out researches within the agricultural sector within a rural community. They were, therefore, able to assess and learn the realities and challenges of the local people within the community in a very fast and effective manner. As such, rapid rural appraisal practitioners were able to operate in multi-disciplinary teams and thus shape the method into an efficient system by pioneering the employment of partly structured interviews in combination with visual methods in facilitating rapid and fast learning from participants or respondents. The method is primarily based upon the collection of data and forms the bedrock upon which other methods of participatory development were formed.

The Participatory Rural Appraisal (PRA) method is a participatory development method that acts as a basis by which people within their local settings can determine the problems or issues that are of deep significance to them (McLoughlin and Lee, 2007). From that standpoint, they are then able to share with others and formulate logical analyses of the issue and consequently employ the method to intervene and monitor the issue. The method, therefore, facilitates empowerment by legitimizing the

local knowledge and thus causing the researcher to catalyze change. Even though the method was initially developed from various methodological approaches like agro-ecosystem analysis and rapid rural appraisal, it is effective within any setting in which its applications are appropriate to satisfy the needs and interests of the research practitioner and the general community. Effective practices within the contexts of the participatory rural appraisal involve an acknowledgment of the value of long-time observations of the participants as well as their field presence. This, therefore, enable the practitioner to have basic knowledge of the field as well as developing a relaxed and warm rapport. Therefore, one of the most crucial elements of the method is that the practitioner is required to operate with the local populations to learn the needs of those people and develop and adapt effective solutions to those problems.

The Participatory Learning and Action (PLA) plan refers to an approach that primarily focuses on engagement and learning about communities. The method, therefore, combines a series of participation and visual techniques with the natural techniques of interviewing as a way of learning and analysis collectively (McLoughlin & Lee, 2007). PLA plan is also instrumental in identifying the specific needs and of society and developing projects that are aimed at serving as solutions to these problems. The approach serves to act as a consultation tool, offering the potential for active participation of the people within the communities in matters that shape their lives. Within the rural and poverty-stricken neighborhoods, the approach has proven to be effective in assisting the people to tap into their perspectives and thus enabling them to realize the underlying factors of their problems and the most appropriate solutions to such problems

Participatory development is achieved through involving the community as they know best their needs and therefore, must take part in all stages of development in a

democratic approach, and through empowerment by external donor to strengthen the community capacity to initiate actions (Lelegwe, 2015). This means that the role of the external organization is to facilitate and empower the community towards being self-reliant. The indicators of community participation identified by this study includes level of participation in; Decision making, provision of financial support, contribution of non-financial resources and labor contribution.

2.2.3 Decision Making by Community

Decision making is one of the critical drivers of sustainable community development, because it utilizes local knowledge and experience. Citizens must be given an initiative to make strategic decisions concerning the project stages, from design phase to long term operation and management of the water projects (Olajuyigbe, 2016). According to community participation process (CP), communities should be involved in deciding types of projects to be installed, location, number of water sources, and ways of maintaining the operations of the project (Madajewicz, Tompsett, and Habib, 2017). The project staff has the responsibility of ensuring the decisions made are feasible, and they only play an advisory role.

Participatory Rural Appraisal is typically a generalized approach that encompasses a wide range of techniques which are usually focused and concentrated towards the involvement of the local people in making their own decisions as well as self-assessments (Kapoor, 2002). Additionally, community members can be involved in decision making via a focus group discussion. These group discussions involve a well-enabled facilitator who is well skilled and experienced in assembling representative groups from the subject rural community and creating an atmospheric environment in which the people are free to express their views and opinions on issues like development and the resulting problems as well as how issues can be mitigated. As such, the

facilitator presents the questions which are discussed and concluded by the group members.

With regard to information sharing, the Participatory Rural Appraisal has been employed to increase the knowledge and understanding of the complexity of the problems associated with water projects within communities and consequently in developing solutions and interventions that are effective and widely accepted among the involved stakeholders. It is also effective in the implementation and monitoring of water problems within communities. As such, the approach has proven to be very effective and successful in the provision of data relating to water projects in communities and simultaneously affect agreements between the various stakeholders involved in the projects. For instance, according to Khalid, Shahid, Bibi, Sarwar, Shah, & Niazi (2018), various governments, like in Yemen have initiated the application of integrated water resources management approaches to manage various water projects in Yemen like the water basins that were at the verge of depleting their water reserves.

As project implementation continues, it is critical to communicate and share project updates to all the project stakeholders. This communication provides progress reports, and provide any arising issues and achievements to the implementing organizations and also to the project beneficiaries. Information regarding project progress can be shared using communication means such as frequent correspondence and meetings, and mid-term/end-point monitoring (Muniu, Gakuu and Rambo, 2017). Information shared during such meetings is aimed at ensuring good working relationship among the project team members. These information are not limited to objectives, progress reports, plans and monitoring and evaluation feedback. According to Kapoor (2002), constantly sharing information regarding the project progress is significant in ensuring project success and also sustainability of the project in post-project period.

The recent studies and scholarly works show that there is robust support for advanced and increased changes from the current practices of management in community water projects. The practices and activities should be aimed at developing adaptive and flexible approaches to tackle the issue of management and sustenance of water projects within communities. The integrated approach has led to many debates and arguments regarding the nature and role of various stakeholders in the production of information, which is a vital resource in the formulation and shaping of policies especially concerning water. However, involving beneficiaries in the community water project is a critical part of arriving at a concrete decision and implementation of the agreed solutions to their needs. This is because they are the most powerful agent in determining their needs and interest regarding water as a resource.

The indicators of community participation identified by this study includes level of; information sharing, consultation, and action initiation. Information occurs when project beneficiaries are informed about the project objectives and their effects on their lives; consultation means that people are asked to give views on key issues and their views are implemented. Decision making process is required during project design and implementation. Project initiating action takes place when people make steps and decisions about implementing such initiatives. From the literature reviewed, there is an agreement that in order to achieve community project objectives it is advisable to adopt an effective people-oriented approach (Muniu, Gakuu and Rambo, 2017). This result in empowering the grass root communities who are supposed to take charge of their own development.

2.2.4 Labor Contribution by Community

Labor is one of the significant local resources available in the community. Labor contribution refers to provision of either paid or unpaid labor by the community

members to the project; the community takes part directly in the project execution in form of both skilled and unskilled labor (Ananga, 2015). Members of the community can provide labor by clearing project site, digging trenches to lay pipes, building water tanks, transporting construction materials to the sites, removing silts in dams and water pans and repairing and maintaining water transport lines in post project period (Muniu, Gakuu and Rambo, 2017).

Chesire (2018) carried out a study in Elgeyo Marakwet county and established that citizen participation is crucial in utilizing local labor and expertise to identify, design, and manage community projects in rural areas. This finding relates to the current study that sought to assess community members' contribution to water projects' sustainability. The indicators of labor contribution adopted by this study include level of labor provision in; clearing project sites, transport of project materials, constructions and repairing of the project.

A primary objective to the development of water projects is based on the availability of labor by the community. Labor is essential for the project to run effectively. Labor contribution entails the assistance of either skilled or unskilled labor by paid and unpaid labor sources (Muniu, Gakuu and Rambo, 2017). In most counties, labor is readily available from various skilled and unskilled laborers within the community willing to participate in the projects. Paid laborers are hired from the community to ensure the community benefits from the projects. Through labor provision, the community get engaged in the projects.

Skilled laborers include plumbers, masonries tasked with building water tanks, tractor and machine operators to remove silts in the dams, among other functions. Also, drivers can be categorized as skilled laborers who assist in the transportation of materials.

Drivers are involved in transporting construction materials from the make-shift storage units and residential areas near the construction site. To work as a skilled laborer, one needs a certification confirming their skills. This ensures the hiring of competent workers in the projects, thus avoiding substandard work. Unskilled labor covers the digging of trenches for laying pipes, clearing project sites, and assisting the skilled laborers in their work. People who do not possess any skills fall under this work category. Formal education is not needed to work in this class (Oino, Towett, Kirui, & Luvega 2015).

Moreover, the availability of local engineers in water projects is significant in solving the language barrier in work. According to Achieno & Mwangangi (2018), some community members are limited to local dialect; however, with engineers who understand the Maa community language, work would be much easier through their help in translation. On the other hand, non-government organizations and community-based organizations contribute immensely to the labor provision through voluntary programs.

Water project construction can have severe implications on the ecological state of rivers, water pans and other water catchment areas. Accordingly, proper site preparation should be enacted to avoid the repercussions. With help from the community, adequate Environmental Impact Assessment (EIA) should be conducted to ensure the practices embarked on are environmental hazard-free (Kanyanya, Kyalo, Mulwa, & Matula, 2014). Community can assist in site preparation which involves the designing of the site in a manner that doesn't affect water flow with construction sediments. The main challenge in water projects development site preparation is the ability to protect natural community ecosystems. The site preparation cycle commences with clearing the project site with tractors. Installation of fixed plants which include crushers and conveyors

succeeds the clearing. The community can assist in the clearing and preparing project sites, transportation of materials among other labor contributions required in the projects.

2.2.5 Contribution of Non-Financial Resources by Community

Community water projects require various resources for running and maintaining the system during construction as well as post completion period. These resources include raw materials and equipment's from the outside. Non-financial resources that can be utilized towards water projects include land, local machines and equipment, construction materials such as; pipes, sand, gravels, stones and wooden poles among others (Muniu, Gakuu and Rambo, 2017). Provision of these resources is necessary to lower to overall project costs and enhance its sustainability.

Community water projects require various resources to ensure that they remain operational during and after their completion. This requires non-financial input from the surrounding community in the form of equipment, land, construction material and goodwill from the neighboring society. The surrounding community acts as source to vital resources required in the projects. These includes locally available raw materials required in the project such as pipes, cement, storage tanks and mechanical machineries among others. Using locally available non-financial materials not only lowers the overall project cost but also uplifts the local economy (Muniu, Gakuu and Rambo, 2017). Also, land is a key non-financial element required in the execution of any project and that can only be provided by the community. Before the setting up of water projects, governments or those undertaking the contract ought to engage the community for easy transfer of land.

Further, the community plays a major role in the sustainability of the CWPs. Through the necessary training and community mobilization a sense of ownership is developed in the community necessary for the operation and maintenance of the projects. After the community has been taught on water technology, the members can properly handle, use and maintain the facilities. This ensure that the projects remain running for a long period. For instance, items such as water filters should be regularly maintained to ensure they do not deteriorate thus reducing water's quality. As Kanyanya, Kyalo, Mulwa, & Matula, 2014 recommend, community members should be taught how to operate the equipment and business skills so they can collect small water fees to help in maintaining the projects. Finally, through community welfare groups and programs, residents within a project's adjoining area can offer non-paid labour in its construction and maintenance.

2.2.6 Financial Contribution by community

Community financial contribution may take form of cash and in-kind contributions towards financing a community project. These monetary resources decrease overreliance on outside resources, ascertain correctly the true level of demand by the beneficiaries, ensure that outside influence does not distort choices and help build community ownership (Sustainable Project Characteristics, 2013). Financial contribution can be in form of membership fees; cash towards costs, water tariffs, and maintenance fee among others (Muniu, Gakuu and Rambo, 2017). Japan International Cooperation Agency (JICA), opined that, projects that have internal source of funds have higher sustainability compared to counterparts that do not have (Mutsuya, 2016). In this study, financial contribution by community means community supporting the project with finances towards administration, operation and maintenance and replacement costs.

The success of any project is highly dependent on the availability of capital contributions from the local community (paid labor and local materials) or in the form of cash from the government or NGO's. Community financial contributions may also take form of cash and in-kind contributions towards financing the project. Whenever the contribution is in form of cash, it should be within a range of five percent of the total capital cost (Spaling, Brouwer, & Njoka, 2014). In the long run, the money contribution may not be recovered to the contributors but the improved services as well as community participation (jobs) serve as a default gift to the community.

For long, there has been a debate whether user/community Financial contributions cement the ownership of the projects within the community or not. Proponents argue that, the setting up of maintenance accounts for the projects which are maintained by the users is a direct advantage to water project beneficiaries, because they feel ownership of the project and thus strive to ensure its sustainability. As Oino, Towett, Kirui, & Luvega (2015) identifies, nationwide, the government and NGO's may finance the construction of water supply projects but get reluctant on their maintenance after completion and see them as a lesser priority. This leaves this projects in the hands of the community as the potential source of capital to ensure the projects remain running. Through capital contributions in the form of levies for the water, the community can effectively keep the projects running for a long period. This fosters the community ownership of the project and view it as a part of their livelihood which they should maintain at all costs.

On the other hand, Spaling, Brouwer, & Njoka, (2014) argued that, most community water users see water as a free commodity and thus unwilling to pay for it. When such members are hard-pressed for some fees to maintain the projects, they see this as extortion and thus eventually distance themselves from the projects. Some community

members may argue, the fees, which come in form of donations from community members or fines upon breaking rules and water levies, may get embezzled by those tasked with collecting them thus unwilling to contribute. The lack of accountability and misappropriation of funds makes community members to draw back their contributions. Community financial contribution is crucial for the long-term sustainability of projects. Accordingly, the project's managing team should embark on the techniques to restore the willingness to pay by the community members. They should embark on campaigns to educate the community on the essence of taking up the projects as part of their livelihoods. Moreover, the managing team should reach out to the community in meetings, events and social gatherings and expound on the importance of community collaboration in ensuring the projects sustainability.

2.3 Theoretical Framework

This section discusses Sustainability theory that supports the dependent variable, Empowerment theory that explains community participation and the main theory, Asset-Based Community Development (ABCD) which supports this study. The study was guided by ABCD model.

2.3.1 Sustainability Theory

The theory of sustainability came about as a result of the work of Thomas Malthus (1766-1834) and David Recardo (1772-1823), the two scholars first work on environmental limit concepts that was based on an economic viewpoint of how humankind can conduct economically beneficial activities while protecting the natural resources, needs, and quality of life of future generations. Protecting natural resources is crucial in maintaining the ecological balance between economic and social human needs. Sustainability and sustainable developments are largely integrating to societal goals due to skyrocketing environmental and social problems faced by societies

worldwide. Bettencourt and Kaur (2011), identify the economy, environment, and society as the main pillars of the theory of sustainability. The long-term goals of sustainable development include fostering social cohesion, promoting equity and fairness, empowering people, increasing community participation, strengthening institutional development, and maintaining cultural identity (Carol, 1999). The concept of sustainability focuses more on current development while sustainable development embraces long-term goals. According to Bettencourt and Kaur (2011), sustainable design and construction of development projects ranks among the critical goals of sustainability.

In the study concept, the theory of sustainability and sustainable development incorporate the ability of society to sustain and balance its resources, developments, and environment in line with its population while not compromising the future needs. Therefore, community collaboration in the developmental planning process is essential in achieving sustainability goals as the sustainability of project success hinges on community involvement (Nyaguthii & Oyugi, 2013). Community preferences should be the main determinant advocated by the empowerment theory in identifying the community's needs and interests (Carol, 1999). Community participation is regarded as the main precise data collection method in understanding community preferences. The sustainability of water projects' success hinges on joint efforts between the developers and the communities. Public participation should be emphasized as it creates a positive bond between the two parties. The community contribution is indispensable as they serve as the contributors to the water projects, for instance, labor providers. Moreover, community collaboration assists in addressing whichever concerns the community might have on the projects.

Development projects are critical in economic development of a community. However, the critical nature of the projects' should not override the concepts of sustainability and sustainable development (Nyaguthii & Oyugi, 2013). Consequently, water projects should align with sustainable development principles to strike a balance between the current generation's needs and those of the future generation. The rationale used in constructing and maintaining water projects should prioritize on conserving the ecosystem. According to Carol (1999), conservation of the ecosystem is the ultimate goal in sustainable development. In that sense, the development of water projects should not result in ecosystem hurting activities. According to Carol (1999), water projects should complement water sources and the ecosystem at large rather than damaging the aquatic and terrestrial ecosystems.

Additionally, water projects ought to aid the sustainable development of the communities in the region. (Nyaguthii & Oyugi, 2013). The benefits aid in the development of a positive attitude to the development projects. The positive attitude is crucial as the community relishes ownership of the water projects, in turn aiding in preservation and sustaining the water projects. Furthermore, the water projects' development should aid in conserving the community's cultural heritage (Nyaguthii and Oyugi, 2013). Albeit the importance of the developments, social traditions and cultural heritage should be protected. Cultural heritage is a significant part of a community's future, notwithstanding not a necessity.

A short-sighted focus on development projects is the main hindrance in sustainable development (Carol, 1999). Therefore, project developers a clear blueprint regarding the long-term benefits and risks should be developed before the commencement of projects. The blueprint assists in deriving mechanisms to solve the future risks hence lessening the negative impact on the community’s future needs. Private and public

stakeholders should be mobilized for a common purpose on sustainable development. Through sustainability and sustainable development concepts, the balance between community development projects and the community's future needs is achievable.

2.3.2 Empowerment Theory

Empowerment refers to a participatory approach that enables individuals and the community, achieve their goals by triggering mutual help to make a responsive community. The proponents of this theory are Perkins, and Zimmerman (1995) and the argue that, involvement, authority and recognition are critical parts of empowerment. Empowerment creates social policy and social change based on community members' strengths and competencies that is anchored on proactive behaviors towards development (Rappaport, 1981, 1984). As opined by Cornwall (2003), participation is a crucial tool towards empowering individuals and community members. This participation includes shared leadership that is built on collective decision making that recognizes collective actions on how to access and utilize community and government resources. (Cornwall, 2003).

Empowerment theory suggests how government and other humanitarian agencies can assist the community solve their problems on their own. Perkins and Zimmerman, (1995), argued that community members have the necessary skills, knowledge and resources to achieve economic, social development, and what they lack is only what triggers them to recognize these capabilities. Therefore, empowerment can be termed as actions that triggers individuals and communities to mobilize and collectively use resources available within their reach in a responsible manner. Though there are no specifically steps that should be followed during empowerment, but it involves actions taken by government or donor agency to collectively improve quality of life within the community (Perkins, 1993).

Empowerment can well be described as the degree of autonomy and self-determination on people and in communities. According to Mayaka (2020), Empowerment enables individuals to present their interests in a responsible manner and in a determined way in their authority. Empowerment theory scrutinizes individual interaction competencies, systematic support and behavior affecting policy development in the social change process. The principle of empowerment can be applied to improve a community's growth strength and capability.

Theoretical and metaphysical views on empowerment is shown in two respects. This is a vibrant approach that will maximize a person's well-being to boost the condition of a citizen and a society or a state. Empowerment approach has enabled many community issues to discuss by scholars such as poverty, people with disability, women, leadership, youth, single mothers among others. Empowerment is an effective community development approach for resolving Problems by inspiring aimed people to take part in built capacity and potentials.

The concept of community development requires collaboration from all parties including ministries, government departments, non-governmental agencies private sectors and individuals from the community. The success of a community development highly depends on the participation of individuals from the community. The growth, advancement and empowerment of human skills is referred to as group empowerment. The mobilization strategy is debated and related to local residents' interest in the planning process. Since participation is the main objective of community development (Speer et al. 2019). The empowerment approach for community development provides for a critical understanding of sociopolitical environment of the community and must be done in a proper sequence. The involved steps are as follows

The very first step is to create optimism. In this first step, self-esteem and homelessness among the residents of the society is improved to increase the quality of life. In the early stages of this period of empowerment, this is otherwise called a taunt. At government level, including the distribution of stimuli or projects such as competitiveness or growth programs according to their demands and requirements, opportunities and spaces should be given. At government level.

The second stage is wide involvement. The leadership process would not work if leaders and small communities only participate. The empowerment of the members of organizations or groups needs extensive involvement. The broad and active involvement of community residents will lead to successful development decision

The third step is to establish a partnership. This phase is also considered the advanced phase of empowerment. Here, the society has to have strong ties and establish partners with other organizations. The roles of the associate include helping to recognize group assets or services and develop structural capacity to move forward.

The fourth stage is vision building. The members of the group must have a clear vision to anticipate the path before initiating the procedure. The first step is to evaluate the strengths and shortcomings of the ability of the group. Based on the evaluation, the Group will formulate a strategy of objectives and plans for the implementation of development program.

The job schedule is part of Phase 5. Clear guidelines, a list of work plans, tasks and budgets should be provided to the Work Plan. A motivated society should be willing, without supervision, to carry out a working plan and self-designed plan.

The sixth step is the quest for capital. The next step should be to find money to facilitate the execution of the strategy after the budget has been finalized. This can take the form

of money, expertise and know-how. To prevent shortage of resources in the process, the proposal must be based on resources available.

Step seven is by performance development. It is important to build and encourage victory and ensure economic growth to persuade community members to change.

The actors will then be included in the capacity-building process. Highlighting infrastructure growth for enhancing group capacity for accomplishment of a range of targets is the key way of a strategic strategy and task plan. The sustainable growth of the empowerment process needs continuous capacity building.

In the final stage, a strategy plan can be adapted. The society must regularly monitor and evaluate the objectives of the strategy. This will allow for changes at the planning phase. (Speer, Peterson, Christens, & Reid, 2019).

2.3.3 Asset-Based Community Development (ABCD) Theory

This study is grounded on Asset-Based Community Development (ABCD) model. ABCD provides that community development initiatives should aim at making the citizens independent and in control of challenges facing their lives rather than being clients (Fuimaono, 2012). This model values dynamic partnership, collaboration and participation and therefore, it is a relationship driven approach of achieving community development (Ware, 2013). ABCD model was founded by Kretzmann and McKnight, in 1996 and it utilizes a set of participatory tools. Unlike other community development theories, ABCD is built on the premise that recognizing assets and strengths of the communities which are likely to inspire positive action for change (Fuimaono, 2012). According to this theory therefore, every single community has abilities, assets and gifts that can be collectively used to speed up community development.

Assets based community development (ABCD) is an approach to sustainable community development. Besides creating mobilization of a particular community, this model is also concerned with how to link micro assets to the macro environment. The ABCD premise that communities can drive the development process by themselves by identifying and mobilizing existing but often unrecognized assets. Thus, responding to challenges and creating local social improvements and economic development (miller et al. 2018). ABCD can be summarized the following key aspects;

The Asset-based approach; ABCD builds on the assets present in the community and mobilizes individuals, associations and institutions to come together to realize and develop their strengths. The asset-based approach spends an amount of time in identifying the asset of individuals' associations and institutions from a community. The identified assets are then matched with people who have interests in or need for that strengthens. ABCD categorizes assets inventories into 5 groups; individuals, associations, institutions, place-based and connections.

The Deficit based vs. asset-based comparison. In the historical days when an individual had needs, they went to the neighborhood for assistance. But this has shifted in the present day to the belief that neighbors do not possess the skills to help out. Therefore, making them seek services from professions. In so doing it has forced the system to divide them into providers and recipients.

The Power of Associations. The second method on ABCD is that action is realized through the local association who should drive the community development process and leverage additional supports and entitlements. This community development approach is with the principles and practices participatory approaches development where active participation and empowerment are the basis of practice.

The Principles of facilitating ABCD. Most of the communities report social-economic problems with only a small amount of capacity. A wider amount of community capacity is always given into meeting the service and eligibility requirements of external deficit provisions.

Contrary to traditional development approaches, ABCD framework advocates for empowering and creating sustainable outcomes for rural people. It is a people centered and citizen drive approach that enable the local communities identify their needs, prioritize them, decide the most suitable way of achieving them and make contributions towards achieving their own development (Fuimaono, 2012). The ABCD theory changes the development perspective from traditional needs-based, deficit-focus and problem-oriented approach to an asset-based perspective. These assets include community resources available such as land, construction materials, local equipment and human resources, among others that can be utilized to achieve development (Kretzmann and McKnight, 1993). Proponents of this theory refer it as a "half-full glass" approach to intervention, while others call it "capacity focused alternative" because it emphasizes on empowerment perspective that values dynamic partnerships, collaboration and partnership, therefore achieving relationship driven community development (Kigotho, 2016). It is evident that this theory seeks to ensure communities become independent and take control of their development rather than becoming clients.

Although problem identification is the integral part of this approach, solutions to these problems focus on creating and rebuilding relationships between communities, associations, and institutions. ABCD theory therefore, empower communities to recognize their strengths and capabilities, and concentrate on what they have, rather than what is missing and hence contribute by harnessing new skills and resources

towards solving their problems (Ennis and West, 2010). Additionally, this theory has guiding principles and practices that ensure achievement of sustainable economic development.

Table 2.1: ABCD Principles

a) Recognizing and rallying skills, assets and knowledge both in a community and individual level.
b) Changing development perspective from an externally driven one to Community-driven
c) Recognition of socially available capital and also utilizing the formal and informal networks available at the community level.
d) Achieving development based on participatory approaches to empower and make communities owners of the development process
e) Ensuring development process anchored on collaborative efforts to achieve economic development
f) Strengthening civil society through asset-based development

Adapted from Fuimaono, 2012, p.27

Evidence from previous studies reviewed, shows that significant community development is achieved when local communities invest their commitments and resources towards community development projects (Kretzmann and McKnight, 1993). It is evident that ABCD framework has a significant influence on people's attitudes, values and behaviors which enhance community development agenda as provided by the six principles of ABCD which are relevant to the purpose of this study (Fuimaono, 2012). Kretzmann and McKnight, (1996) opined that, community assets include individuals, institutions and associations, whilst Chirisa's (2009) advocated that it includes all other capitals including human, natural, social, physical, financial and political among others. These proponents further agreed that contribution of community assets creates a sense of ownership among communities which enhance sustainable

community development (Fuimaono, 2012). This theory is chosen to guide the study because it advocates for transition from Needs-based, and deficits focused approach to an asset-based perspective and also it activates the access and control over the local assets to achieve sustainable development which is focused by this study.

2.4 Empirical Literature Review

In this section empirical literature is discussed in which variables under study are reviewed.

2.4.1 Sustainability of Water Project and Community Participation

There seems to be a relationship between sustainability and community participation. Davis, (2013) opine that both scholars and policy makers believe community participation debunks myths, enhances trust, boosts and ensures sense ownership among community members. Ofuoku (2011) undertook a study in Nigeria Delta State and applied purposive sampling technique to arrive at 160 respondents sampled from a population of 2,500 beneficiaries. In is research, his findings indicated that community participation positively influenced water projects' sustainability in Delta state. These findings are similar to what (Muniu, Gakuu and Rambo, 2017) established when they used descriptive survey to show that participation by the communities in all cycles of water projects positively influenced sustainability of such projects.

These study findings were further, confirmed by Wanyera (2016), and Havugimana (2013), when they separately used case study and found that community participation in Kiambu and Rwanda consecutively positively influenced sustainability of water projects. However, Marks, Komives and Davis, (2014) while using cross-sectional research design and a sample of 200 established that there was no relation between community participation and sustainability of water projects. Davis et al. (2013);

Ofuoku (2011); (Muniu, Gakuu and Rambo, 2017) used descriptive studies while Wanyera (2016); Havugimana (2013) used case studies and their studies and results were similar. However, Marks, Komives and Davis, (2014) used cross-sectional design and got different result. This means that the community participation does not necessarily influence sustainability of water projects. In this study the researcher used a descriptive research design and correlational research design to determine the influence of community participation on sustainability of water projects in Narok sub-county in Narok County, Kenya.

2.4.2 Decision Making and Sustainability of Water Projects

Community participation in decision making is whereby, community members' takes part in major decisions concerning community water projects. Kisumbi and Nassiuma, (2017) while undertaking a study on the role of citizen participation on sustainability of water projects, used a mixed method approach and sampled out 121 respondents from a population of 40,423 beneficiaries using systematic sampling technique. The researchers established that allowing community members to take part in project decision making positively influenced sustainability of water projects. The study findings were further supported by Mohammad, (2010), and (Muniu, Gakuu and Rambo, 2017), who established that beneficiaries' involvement in decision making is critical towards building trust and sense of ownership among the community members. The researchers established that community participation in decision making results in transparency in decision making, enhance accountability and hence enhance project sustainability.

However, Marks, Komives and Davis, (2014) established that household members should only participate in management-related decisions because sustainability is compromised when they participate in technical decisions. Kisumbi and Nassiuma,

(2017); (Muniu, Gakuu and Rambo, 2017); Mohammad, (2010) used mixed research designs and found the same results. To the contrary, Marks, Komives and Davis, (2014) used cross-sectional design and established that community members involvement in management related decisions positively influences sustainability of water projects, while community involvement in technical decisions negatively influences sustainability of water projects. In conclusion, from the literature reviewed, some findings showed that decision making influence sustainability while other study findings established contrary results. In this study, the researcher used a descriptive research design and correlational research design to determine the influence of community involvement in decision making on sustainability of water projects in Narok South sub-county in Narok County, Kenya.

2.4.3 Labor Contribution and Sustainability of Water Projects

There seems to exist a perception that members can provide either paid or unpaid labor during construction, operation, repair, and maintenance of the community water project to enhance sustainability. (Muniu, Gakuu and Rambo, (2017) while undertaking a study in Kiambu County on the influence community involvement in resource mobilization on sustainability of community water projects, observed that labor contribution by project beneficiaries positively influenced sustainability of water projects. The findings are supported by study in which Nyakwaka, Muronga, and Muvumbi, (2018) established that community labour contribution enhance ownership and ultimately sustainability of the water projects.

However, Kaliba, (2002) undertook a study on participatory evaluation of community-based water projects, and established that community provision of labor negatively influenced the economic efficiency of water projects. This is because in situations of high poverty level among the community members, some members may retreat from

providing free labor to the project for fear of future obligations. Marks, Komives and Davis, (2014) also showed that the depth and not breadth of labor contribution is what enhances sustainability of water projects. Therefore, it is evident from the literature reviewed that not all instances of labor contribution results in sustainability of water projects. In this study, the researcher used a descriptive research design and correlational research design to assess the influence of community involvement in labor contribution on sustainability of water projects in Narok South sub-county in Narok County, Kenya.

2.4.4 Contribution of Non-Financial resource and Sustainability of Water Projects

Non-Financial materials such as locally available construction materials are necessary for community water projects. Mamburi, (2014) conducted a study in Kenya on factors that influences community ownership of water projects. While using a descriptive survey research design, he sampled 370 respondents drawn from a population of 9,920 using simple random sampling technique found that, community provision of non-financial materials positively influenced sustainability of community water projects.

The findings were supported by Nyakwaka, Muronga, and Muvumbi, (2019) undertaking a study on the influences of community participation on sustainability of community operated water projects. The researchers while using cross-sectional survey design, and sampled 175 respondents from a population of 320 project beneficiaries using purposeful sampling technique found that project sustainability was achieve as a result of community provision of locally available non-financial resources such as gravel, poles, sand, and equipment's. The findings also concurred with Kanyanya, Kyalo, Mulwa and Matula, (2014), and Muniu, Gakuu and Rambo, (2017) who established that, community participation in provision of non-financial materials would enhance ownership of the community and ultimately leading to project sustainability.

However, study findings by Kilonzo, and George, (2017) found that heavy contribution of non-financial resources such as land may result in different interests, power and perspective on the project among the community members which hinders its sustainability. Therefore, in this study, the researcher used a descriptive research design and correlational research design to determine the influence of contribution of non-financial materials by the community members on sustainability of water projects in Narok South sub-county in Narok County, Kenya.

2.4.5 Contribution Financial resource and Sustainability of Water Projects

There seems to be a relationship between the level of community financial contribution and sustainability of community water projects. Community Financial contribution takes different forms, as follows; in kind contribution, fund raising, paying cash for water, monthly contribution towards operations and maintenance and among other ways of mobilizing financial resources in support of the project (Mutsuya, 2016). Marks and Davis, (2012) conducted a study in Kenya on participation of project beneficiaries and sense of ownership of community water projects, used stratified random sampling technique to select 313 water systems out of a total population of 621 community water systems, and further utilize systematic sampling technique to select total of 1140 household from each province. The researchers adopted cross-sectional design research design and established that the level of financial contribution by the community is positively associated with the level of community sense of ownership and hence overall sustainability of community water projects.

The study findings were supported by Marks, Komives and Davis, (2014) who established that, the depth of financial contribution, as measured by the mean cash value given toward capital costs, is significantly and positively associated with both financial sustainability outcomes. Also, studies by (Muniu, Gakuu and Rambo, 2017) and Carter,

(2009) found that it is crucial for the communities to contribute cash towards cost recovery as it is important issue in meeting financial sustainability of water projects. From the above literature reviewed, it evident that, community Financial contributions have influence on sense of ownership, and ensures financial independence of the community water project, leading to its sustainability. In contrast, a study by Achieno and Mwangangi, (2018) found that, involving community members in sharing costs for operation and maintenance of their water project influences sustainability. However, this needs to be done in consideration with financial capacity of the community. In this study, the researcher adopted a descriptive research design and correlational research design to determine the extent to which financial contribution by the community influence sustainability of water projects in Narok South sub-county in Narok County, Kenya.

2.5 Conceptual Framework

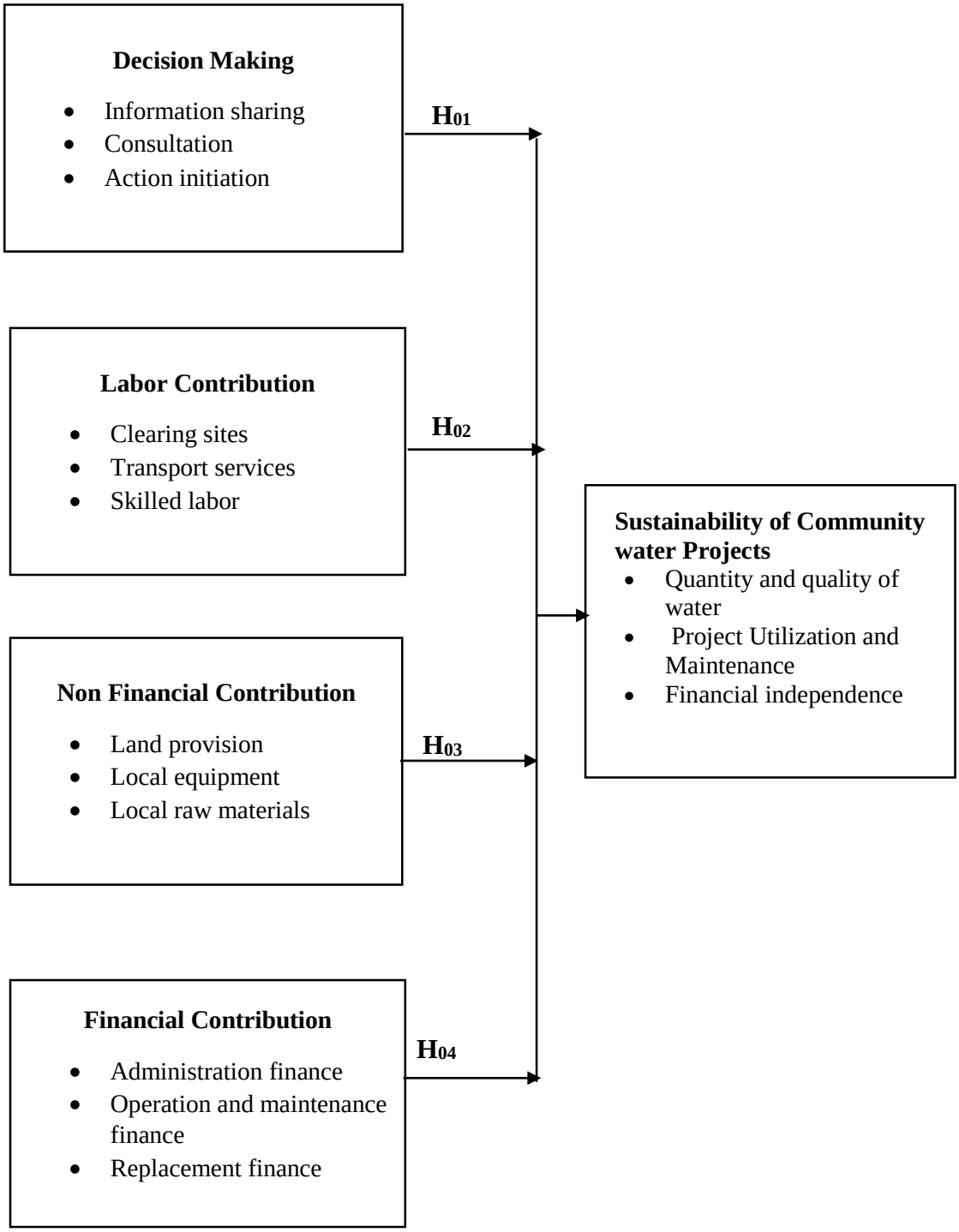

Figure 2.1: Conceptual Framework

Source*: *Author (2020)

Table 2.1: Summary of Literature

Variable	Author (Year)	Title of the study	Methodology used	Findings	Knowledge gap
Community participation in decision making	Kisumbi and Nassiuma, (2017)	Effects of Stakeholders' Non-participation on Sustainability of Water Projects in Kenya	Descriptive research design and systematic sampling was used to select 121 household- heads	78.5 % of respondents did not participate in therapy and manipulation (decision making) in community water projects while 11.6% did.	Why community should participate in project decision making and yet they may lack technical expertise is the knowledge gap
	(Muniu, Gakuu and Rambo, 2017)	Community Participation in Project Decision Making and Sustainability of Community Water Projects in Kenya	Cross-sectional survey design in which a systematic sample of 290 farmers were interviewed.	Involving the community members in decision resulted in 29.3% increase in sustainability of community-based water projects.	
	Marks, Komives and Davis, (2014).	Ghana Community Participation and Water Supply Sustainability: Evidence from Hand pump Projects in Rural	Descriptive survey design	It is the depth of community participation and not breath that enhanced sustainability of hand pump sustainability, whereas the breadth of community participation is not.	
Community participation in labor contribution	Nyakwaka, Muronga, and Muvumbi, (2018).	Community participation influence on sustainability of Water Projects in Central Nyakach Sub- County, Kisumu, Kenya	cross-sectional survey design Systematic stratified random and purposive sampling techniques was adopted to select 25 respondents	Community participation in collective decision-making process enhance community participation, ownership and hence sustainability	The knowledge gap is that why there is no consensus on the influence of community involvement through labor contribution and sustainability of community water projects from the literature reviewed.
	Kaliba, (2002).	Community participation and evaluation of Community-Based Water projects: The Case of Central Tanzania	Case study	Voluntary labor contribution by community influence sustainability of community water projects, while coercive contributions create hostility towards the project and hence negatively affecting sustainability.	
	Kilonzo, and George, (2017).	Stakeholder engagement and sustainability of Water Projects.	Cross-Sectional research design	In the context of power structure, stakeholder empowerment enhanced sustainability status of community water projects	
	(Muniu, Gakuu and Rambo, (2017)	Community Participation in Project Decision Making and Sustainability of Community Water Projects in Kenya	Cross-sectional survey research design.	Labor contribution by the community has a positive relationship with sustainability of water projects.	
	Marks, Komives and Davis, (2014).	Ghana Community Participation and Water Supply Sustainability: Evidence from Hand pump Projects in Rural	Descriptive survey design	Established that the depth and not breadth of labor contribution results in sustainability of community water projects	

Variable	Author (Year)	Title of the study	Methodology used	Findings	Knowledge gap
Contribution of Non-Financial materials by Community and Sustainability of Water Projects	Mamburi, (2014)	Factors Influencing Community Ownership of Water Projects in Kenya. A Case of Kinna Division Isiolo County.	Descriptive survey research design in which a simple random sample was used to obtain a sample of 370 respondents.	Community provision of Non-Financial materials has a positive influence on sustainability of community water projects	The knowledge gap here is that the researchers did not explore the extent to which involvement of the community beneficiaries in provision of Non-Financial materials influence sustainability.
	Nyakwaka, Muronga, and Muvumbi, (2019).	Influences of Community Participation on Sustainability of Community Operated Water Projects	Cross-Sectional survey design in which purposeful sampling technique was used to draw a sample of 175 respondents.	Involvement of community in provision of Non-Financial materials such as gravel, poles, sand, and equipment's influence sustainability of community water projects	
	Kanyanya, Kyalo, Mulwa and Matula, (2014).	Community participation in development projects in Kenya: Analytical review of factors influencing sustainable water projects in Shianda Division, Kakamega County.	Descriptive survey design was used in which Stratified proportionate random sampling techniques were used to select 196 respondents.	Community Participation through provision community capital namely; materials and cash influence sustainability of water projects	
Community Financial contribution and Sustainability of Water Projects	Marks and Davis, (2012).	Factors Affecting Farmers' Ability to Pay for Irrigation Facilities in Nigeria: The case of Oshin Irrigation scheme in Kwara State.	The researchers adopted cross-sectional design while using both stratified random sampling and systematic sampling technique to select total of 1140 household from each province.	Established that the level of Financial contribution by the community is positively associated with the level of community sense of ownership and hence overall sustainability of community water projects.	The knowledge gap is to explore whether the depth or breadth of community participation in Financial contribution influence sustainability of water projects in Narok South Sub-County.
	Marks, Komives and Davis, (2014)	Community Participation and Water Supply Sustainability: Evidence from Hand pump Projects in Rural Ghana	Descriptive survey design	Established that the depth of Financial contribution is significantly and positively associated with both financial and sustainability outcomes	
	(Achieno and Mwangangi, 2018)	Determinants of Sustainability of Rural Community Based Water Projects in Narok County, Kenya	Descriptive survey and used simple random sampling to select 85 respondents from a population of 163.	Established that involving community members in sharing costs for operation and maintenance of their water project influences sustainability	

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology that were be adopted in conducting this study. It includes; the research design, target population, sample size, sampling procedures and research instruments. This chapter also contains data collection procedures, data analysis techniques and ethical considerations.

3.2 Research Design

Research design is a blueprint on how the researcher is going to collect and analyze data in a way that maintains relevance to the research purpose. It shows how research is structured in a manner that will economically generate answers to the research questions (Kothari, 2012). The study adopted explanatory research design. This research design is a scientific method that gives more light on the nature of the problem being studied. Explanatory research design gives a scope and nature of cause-and-effect relationships by using theories or hypotheses to represent the forces that caused a certain phenomenon to occur. It has a descriptive element and goes beyond just describing the relationship and gives more details on the effects and the nature of the relationships between the two variables of the study (Creswell, 2014). Therefore, this design was more suitable in this study because it provides and investigation of the causes of a particular phenomenon without just giving a description of them. Hence, the researcher adopted an explanatory research design to provide an understanding on multiple realities of community participation on sustainability of community water projects.

3.3 Description of the Study Area

The study was conducted at Narok South Sub-County in Narok County, Kenya with six wards that include Maji Moto, Ololulung'a, Melelo, Loita, Sogoo and Sagamian. Ten water projects were selected for the study. Majority of the residents are mixed farmers; keeping livestock and planting wheat and maize.

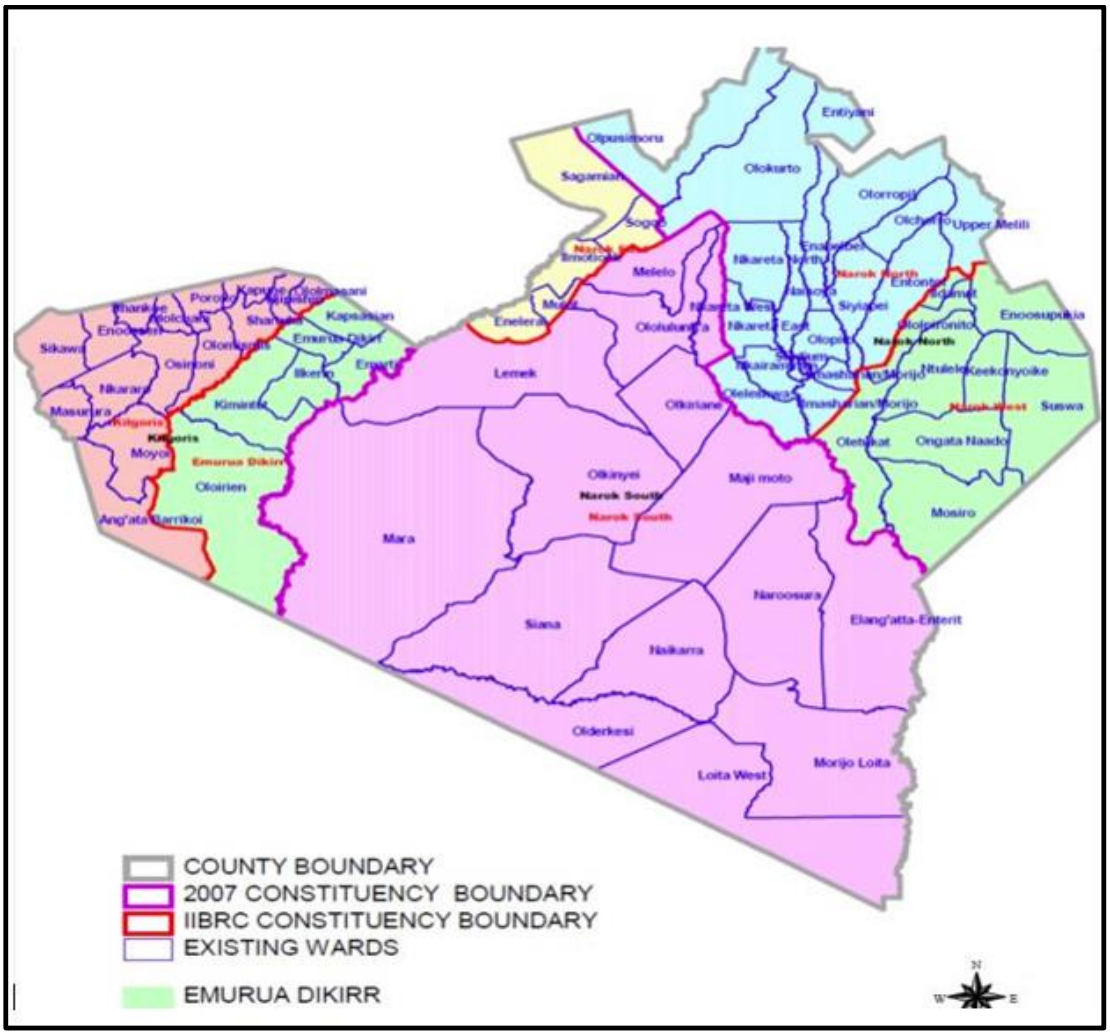

Figure 3.1 Narok County Map

Source: Narok Water Service Board (2020)

3.4 Target Population

The study targeted community water projects in Narok South Sub-County. Population refers to an entire group of items, objects or activities for which a sample is to be

obtained (Kombo and Tromp, 2006). The target population for the study was 15,500 beneficiaries from ten water projects distributed as; Emagutian, Enkosamai, Leshuta, Lekanga, MorijoLoita, Maji Moto, NarosuraNtuka, Ole Mesutie, olololoitikoshi, and Ololunga in the Sub-County.

3.5 Sample Size and Sampling Procedure

This section describes the framework within which sampling will be performed. It gives a description of sample size and sampling procedures to be utilized during the study. A sample is a proportion of entire population selected to study the population and sampling strategy is the procedure utilized to obtain a sample (Breyman, 2008).

3.5.1 Sample size

The desired sample size was determined by adopting Cochran's formula (1977)

$$n_0 = \frac{(Z)^2 * (p)(q)}{(d)^2}$$

Where-:

n_o - The desired sample size

z - The standard normal deviation, set at 1.96, which corresponds to 95% confidence level

p - The proportion in the target population estimated to have a particular characteristic. If there is no reasonable estimate, then use 50 percent (the study used 0.50).

q = 1.0 – p

d = The degree of accuracy desired, here set at 0.05 corresponding to the 1.96.

In substitution, n= {1.962 x 0.5 x (1-0.5)}/ 0.0025= 384

3.6 Sampling Procedure

The study adopted simple random sampling in the selection of the subjects to be interviewed. Identification of community beneficiaries was achieved by utilizing simple random sampling. Sample respondents from each project was arrived by calculating the proportion of each project beneficiaries among the total beneficiaries served by these ten water projects.

Table 3.1: Sampling Design

S/no	Name of water project	Number of beneficiaries per project	Proportion of the beneficiaries in the study population	No. of respondents picked for the study population as proportion desired sample
1.	Emagutian	1,000	0.065	25
2.	Enkosamai	500	0.032	12
3.	Leshuta	1,200	0.077	30
4.	Lekanga	1,000	0.065	25
5.	MorijoLoita	1,500	0.097	37
6.	Maji Moto	1500	0.097	37
7.	NarosuraNtuka	2,000	0.129	49
8.	OleMesutie	1,000	0.065	25
9.	Ololooitikoshi	800	0.052	20
10.	Ololunga	5,000	0.323	124
Total		**15,500**	**1.000**	**384**

Source: Narok Water Service Board (2019)

Once the number of respondents from each water project was identified from the given table above, the list of all the registered water beneficiaries of each water project was obtained from Narok water services board and a computer program was used to generate random numbers that were used to pick respondents from each water project.

3.7 Method of Data Collection

Questionares were used to collect data from the respondents regarding factors that influence sustainability of water projects in Narok South Sub-county. Questions was articulated in manner that the answers expected constitutes relevant data needed as oppined by Brace (2004). Primary data was collected using these quesitionnaires, by elicitng written responses from the subjects. Closed ended questions were used to obtain knwoldege of the respondents. The questionnaire is organized from section A to F with section and the questions included was based on background information and five questions on each indicators for measuring proposed variables which include community participation in; decision making, labor contribution, contribution of non-financial materials, financial contribution and sustainability of community water projects in Narok South Sub-County.

3.7.1 Reconnaissance

The questionnares were pilot tested before being used to collect data. Pilot study is a study conducted at small scale with the aim of expososing deficincies within questionnare and to weed out vague questions, it is intended to measure reliability and validity of the data collection instrumements before the main research (Jackson,2009).To achieve this research questions was administered to respondenents from a randomly selected water projects in Narok west Sub-County. The researcher chose respondents as follows; Narok West Constituency Development Fund, Water management committee members and community beneficiaries. The study adopted 10% of the study sample size to conduct pilot study as provided by Mugenda and Mugenda, (2003). This study was conducted to ensure that the data that was anticipated to be collected could be meaningfully analyzed realting to research hypotheses and to

also confirm if time, staff and cost requirements were valid (Augustino, 2015). The pretested questionnarres was edited and updated before final data collection.

3.7.2 Validity Research Instruments

Validity reffers to acuracy and scientific meaningfulness of the conclusions based on the results of the study. It refers to the level to which the results obtained from the data analysis represents the study phenomenon (Doole, Zubrick, and Walters, 2013). The aim of testing the validity is to ensure the accuracy with which the obtained data represents the variables within the study. The types of validity relevant to this study includes, face, content and construct and creterion validity. Content validity procedures was utilized in enhancing the validity of the research instruments as oppined by Mugenda and Mugenda, (2003). Supervisor opinions, experts, and other lectures within the department was also utilized to give their opinions and advises regarding the content validity of the research instruments.

Construct validity was ensured by making sure the questions presented in the questionnaire were developed in a manner that avoids vagueness and ensure clarity to the respondents. Factor analysis was used to test construct validity of the reseasch instrumenmt. Factorability is an assumption that atleast there is some corelation among the variables making it possible for some factors to be identified. Kaiser-Meyer-Olkin (KMO) test was done to assess sampling adequacy and was established that the KMO test statistic greater than 0.5 indicating that the sample was adequate. Bartlett's Test of Sphericity was done to determine the suitabvility of using factor analyis. According to Hair *et al.,* (2013), Bartlett's Test of Sphericity of *p*-value less than .05 indicates that factor analysis is suitable. From the study, Bartlett's Test of Sphericity indicated a chi-square value of 2391.050 with an associated p-value of 0.000 which meets the above highlighted condition. Hence from the given Kaiser-Meyer-Olkin (KMO) and Bartlett's

Test of Sphericity statistics, it was concluded that factor analysis was an appropriate approach for assessing construct validity of the scale.

Internal validity and external validity was also considered. According to (Muniu, Gakuu and Rambo, 2017), internal validity is a property of systemic error or bias. Therefore, to ensure internal vality of the questionnaire, the respondents were picked through random sampling, a manner that ensured all members of the study population were given equal chance of being selected. External validity is the extent to which the results can be generalized to other situations and people as provided by Mugenda and Mugenda (2003). Triangulation was applied to ensure external validity of the research instruments. This is whereby, semi structured interview guide, open and close ended questions were asked during the pilot study.

3.7.3 Reliability of Research Instruments

The reliability of the research instrument was determined after pre-testing the instruments through the pilot study. This is the measure of consistency of the results achieved from the research instrument with the repeated attempts (Mugenda and Mugenda, 2003). The reliability of the questionnaire was tested using the following alpha from the cronbach fomula.

$$\alpha = \left(\frac{n}{n-1}\right) 1 - \frac{\sum\left(SD_i{}^2\right)}{SD_i{}^2}$$

Where: α is alpha of Cronbach, n is the number of respondents to the questionnaire, SD^2 is the questionnaire score variance, and $\sum (SD^2)$ is the summation of items scores variances. Cronbach's alpha reliability coefficient measures the interrelatedness of items in the questionnaire. According to George and Mallery (2003) Cronbach's alpha reliability coefficient of 0.8 and above is reasonable and consistent while a

coefficient less than 0.5 is not consistent and therefore unacceptable. The reliability of this study at 95% confidence interval results to alpha value of 0.874 or 87.4% which was considered to be above average and thus the research instrument was reliable to a larger extent. Lack of the instrument to score higher score can be due to respondents' biasness, guess on researcher's intention or Hawthorne effects.

3.8 Data Collection Procedure

Previous research reports was reviewed to obtain secondary data and provide an in depth koweldge on research issues relating to the research topic. Constructed questionnares was utilized to capture primary information on objectives. These data collection instruments was pilot tested to ensure suitability to collect data from the community beneficiaries, projects staff and water management committee members.

Before embarking on data collection exercise, the researcher sought a research permit from the Moi University School of post graduate and National Commission for Science and Technology and Innovation (NACOSTI) of the Ministry of Education. Data from community water project beneficiaries was collected with the help of two research assistants to administer questionnaire to the respondents and also assisting in to clarify some items in the questionnaires. Research assistants were trained on how to handle various issues that may arise during administration of questionnaires and on ethical procedures of conducting a research to ensure competence.

3.9 Methods of Data Analysis

Quantitave data analysis utilized measures of cenntral tendency such as mean, mode and median, frequencies, standard deviation and variance while inferential statistics employed pearson *r* in tetsting the relationships between the main study variables and also tets hypotheses. An *r* of more than 0.5 indicated a strong correlation, and when *r*

is between 0.3 and 0.49 showed moderately strong corelation and value below 0.29 indicated weak corelation. A correlation of 0 indicated no relationship.

3.9.1 Quantitative Data Analysis

Quantitative data was collected using questionnaires, which sought data on four independent variables and dependent variable. Qualitative data collected by use of likert scale in questionnariures was coverted into quantitative data by adopting a 5-point equidistant scale as guided by Carifio and Perla, (2007). The scale provide ranges between the points as follows; Strongly disagree (1<SD<1.8), Disagree (1.8< D<2.6), Neutral (2.6< N<3.4), Agree (3.4<A<4.2) and Strongly Agree (4.2< SA<5.0). Basing on assumptions of central limit theorem, this study will consider mean above 3.4 to conclude that majority of the respondents are in agreement with the expressed opinions in the item data.

The quantitative data collected was analysed using descriptive and inferential statistics. Descriptive statistics were analysed using percentages, means and standard deviation while inferential statistics was analysed using Coefficient of Determination (R^2) and Pearson's Product Moment Correlation (r).

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2}\sqrt{n(\sum y^2)} - (\sum y)^2}$$

Where: *r* is the Pearson product-moment correlation coeficient: x is values for the first set of variables; y is values for the second set of variables; n is selected number of respondents.

The ensuing statitstics were interpreted basing on the following considerations: When *r* = -1 indicates a perfect negative linear relationship; *r* = -.70 shows a strong negative linear relationship; *r* = -.50 means that there is moderate negative relationship, *r* = -.30

is an indication of weak negative relationship; $r = 0$ shows no relationship; $r = .30$ is an indication of weak positive relationship; $r = .50$ means that there is moderate positive relationship; $r = .70$ shows a strong positive linear relationship; When $r = 1$ indicates a perfect positive linear relationship. Also, a *t*-value of more than 1.96 with p less than .05 is an indication that the independent variable is a signifigant predictor of the dependent variable within and beyond the sample. A *t*-statistics value less than 1.96 having signifigance of greather than .05 shows that the independent variable is not a signifigant predictor of dependent variable beyond the sample. Coeficient of determination (R^2): $R^2 = 1$ indicates a perfect fit and $R^2 = 0$ shows no variation.

F-test was used to test hypothesis that community participation does not have signifigant influence on sustainability of communitywater projects. To ensure control for multicollinearity, the study adopted a step wise regression analysis of the reationship between independent and dependent variables.

3.9.2 Analytical Framework

$Y = \alpha_0 + \beta_1 X_1 + \varepsilon$……..(i)

$Y = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$…….(ii)

$Y = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$…… (iii)

$Y = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$……..(iv)

Where; Y= indicators of sustainability of community water projects,

α_0= alpha coefficient or the y- intercept,

β_1= beta coefficient of community participation in decision making,

β_2=beta coefficient of community participation in labor contribution,

β_3= beta coefficient of community participation in contribution of non-financial materials,

β_4= beta coefficient of community participation in financial contribution,

X_1= indicator of community participation in decision making,

X_2= indicator of community participation in labor contribution,

X_3= indicator of community participation in contribution of non-financial materials,

X_4= indicator of community participation in contribution of financial resources,

ε= error term.

Table 3.1: Statistical Tools for Hypothesis Testing

	Hypotheses	Test statistics	Decision point
H_{01}.	Decision-making by community members has no significant influence on water projects' sustainability in the Narok South sub-county in Narok County, Kenya	β, *p*-v, F, *r*, ΔR^2, *t*-value	Sign. at $p \leq .05$, Or $t \geq 1.96$
H_{02}.	Labor contribution by community members has no significant influence on the sustainability of water projects in Narok South sub-county in Narok County, Kenya.	β, *p*-v, F, *r*, ΔR^2, *t*-value	Sign. at $p \leq .05$, Or $t \geq 1.96$
H_{03}.	Non-financial contribution by community members has no significant influence on water projects' sustainability in the Narok South sub-county in Narok County, Kenya.	β, *p*-v, F, *r*, ΔR^2, *t*-value	Sign. at $p \leq .05$, Or $t \geq 1.96$
H_{04}.	Financial contribution by community members has no significant influence on water projects' sustainability in the Narok South sub-county in Narok County, Kenya.	β, *p*-v, F, *r*, ΔR^2, *t*-value	Sign. at $p \leq .05$, Or $t \geq 1.96$

3.9.3 Assumptions of Linear Regression

This study was grounded on the assumptions of linear regression model to be used in quantitative data analysis. These are the assumptions of Ordinary Least Squares 'OLS' regression model.

3.9.2.1 Normality Test

It was assumed that all residual 'error terms' were normally distributed. Normality test was done by looking at the skewness and kurtosis values. As argued by Shapiro and Wilk (1965), normality test should be performed so as to ascertain the appropriate test

to be performed and ensure that assumption of normal distribution was adhered to. Kolmogorov-Smirnova (K-S) and Shapiro-Wilk tests were conducted to test for the normality of sustainability of community water project as the dependent variable. These tests were applied to detect any departures from normality.

3.9.2.2 Linearity Test

Linearity assumption was tested graphically using Predicted Probability test 'P-P' plot and existence of any outliers was checked. The test established that the relationship between the study variables was linear. ANOVA output was used to ascertain linearity of the data before conducting regression analysis. According to Osborne and waters (2002), linearity test is crucial before performing regression analysis because regression model can accurately estimate the relationship between dependent and independent variables only when the relationship is linear.

3.9.2.3 Test of Homoscedasticity

Homoscedasticity assumption of regression is that all error variances are equal. It is also called homogeneity of variance and assumes that values of error term have constant variance. Homoscedasticity was tested using Lavene statistics.

3.9.2.4 Test of Heteroscedasticity

Once homoscedasticity test has been conducted and the values of error terms are found not to be constant, then it is said to be heteroscedastic. This test is the opposite of homoscedasticity test, therefore, Lavene statistic was used to assess presence of heteroscedasticity.

3.9.2.5 Multicollinearity Test

Multi-collinearity is said to exist when correlation exists among the predictor variables. Multicollinearity assumption provides that independent variables should not be highly

correlated and was tested using Variance Inflation Factor (VIF) and collinearity statics which established that the assumption was not violated.

3.9.2.6 Autocorrelation test

Autocorrelation refers to the correlation between members of a series of observations ordered in time or space. Durbin-Watson test was used to test presence of autocorrelation between the variables of the study.

3.10 Ethical Consideration

The researcher ensured that the right to self-determination of the subjects was observed. According to Burns and Grove (2001), the right to self-determination is based on the ethical principle of respect for a person. The researcher ensured that participants were given adequate information regarding the research, this enabled them to be capable of comprehending the information; having the power of free choice, enabling them to consent voluntarily to participate in research or declined participation.

The researcher also observed the principle of right to confidentiality of the subjects. Confidentiality is the researcher's management of private information shared by the participants, which must not be shared with others without the authorization of the participants (Muniu, Gakuu and Rambo, 2017). The information and identity of the respondents was kept confidential during the process of data collection, to ensure that there is no unnecessary disclosure of the identity of the participant.

The researcher additionally maintained privacy in all personal matters arising from information coming from the participants. This was in the form of feelings, beliefs or attitudes, and opinions. Raw data was protected from unauthorized persons and will not be shared or names linked to the data. The information obtained was only used for the purposes of this study. The researcher also sought permission from Management of

Narok county Water Service Board, management of water users' committees and the consent of the individual respondent from the membership of water projects.

3.11 Limitations of the Study

The challenge of the language barrier anticipated was encountered during data collection. It was expected that the respondents might not understand the English language and hence may provide false information since Narok South Sub-County has a high illiteracy level among the residents. However, the researcher created an informal environment to make the respondents comfortable and interpret the Questionnaires in Kiswahili for the respondents not to understand. Additionally, Narok South Sub-County is a vast county with scattered villages, and traversing all the water projects was a significant challenge. However, I tried to minimize this challenge by using a powerful motorbike with an engine capacity strong enough to traverse the sub-county's rough terrains.

Additionally, during the data collection period, there was a community conflict between the Kipsigis and the Maasai, which gave me a challenge in reaching out to respondents. However, I moved around the area with the chiefs' facilitation and showed my research permit.

3.12 Assumptions of the Study

This study assumed that the respondents who were be selected were the key ones needed in soliciting the relevant information required in the research and that they were sincere in providing the correct information that was used in concluding. The study was guided by normality, linearity, independence of residuals, homoscedasticity, and multicollinearity assumptions which were tested using, Variance Inflation Factor (VIF), Kolmogorov-Smirnova (K-S) and Shapiro-Wilk tests and Durbin-Watson tests among

others. These assumptions enabled the researcher to conclude that; the sample represented the population; the validity of the questionnaire used in data collection and that it had the desired constructs. It was also assumed that the response on the questionnaires were correct and truthfully.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION

4.1 Overview

It focuses on analyzing, interpreting, and discussing the study findings and is organized into thematic and sub-thematic areas based on study objectives. Thematic areas include community participation in decision making and sustainability of water projects, community participation in labor contribution and sustainability of water projects, community participation in the provision of non-financial materials and sustainability of water projects, community participation in financial contribution and sustainability of water projects and the joint community participation and sustainability of water projects. It involves response rate, demographic characteristics of the respondents, and descriptive and inferential statistical results.

4.2 Response Rate and Missing Data

This study's respondents were beneficiaries of community water projects in Narok South Sub County, Narok County. 384 Self-administered questionnaires were distributed to the respondents, and 322 were returned, indicating 83.85% return rate. Therefore, this response rate shows an outstanding representation of the study population above the required 50%. According to Chen 1996, a more extensive response rate reduces non-response error, and hence the 83.85% response rate was appropriate for data analysis.

Table 4.1 Response Rate

Statement	Frequency	Percentage
Returned	322	83.85%
Unreturned	62	16.15%
Total	384	100%

Source: Research Data 2020

4.3 Demographic Characteristics

This section presents the demographic information of the respondents of the ten water projects within Narok South Sub-County. Membership to the community water project was the main criterion used to determine the study participants, and all members of the project were eligible to participate in the study. One respondent represented a household and an examination of the questionnaire responses for each of the 322 respondents pertains to gender, age, education level, and project tenure.

4.3.1 Gender

The study findings revealed that most of the respondents were male, with a percentage of 50.3%, followed by females with 49.7%. The respondents who presented their views on the studies various variables were almost equal gender representation.

Table 4.2 Gender

Gender	Frequency	Percentage
Male	160	49.7%
Female	132	50.3%
Total	**322**	**100%**

Source: Research Data 2020

4.3.2 Age

The study also sought to determine the age bracket of the respondents. Results reveal that most of them were between the ages of 34-41, accounting for 39.4%, followed by those above 42 years with 31.7 %, then 26-33 years with 21.7 %, and 18-25 years 7.2%. This depicts that majority of the beneficiaries are middle-aged.

Table 4.3 Age

Age in Years	Frequency	Percentage
18-25	23	7.2%
26-33	70	21.7%
34-41	127	39.4%
Above 42 Years	102	31.7%
Total	**322**	**100%**

Source: Research Data 2020

4.3.3 Level of Education

The study also explored the respondents' level of education. Concerning the level of education, the findings showed that most of the respondents had a primary level of education with 51.0%, followed by a secondary level with 24.8%. Those with no basic education were 16.5%, followed by those with a tertiary level with 4.0%, and those with university-level accounting for 3.7%. Therefore, the study revealed that the communities in water projects had a moderate level of education, which means that they could undertake right and informed decisions that influenced water projects' sustainability. Gitari, Mbabaz, and Jaya (2016) opined that households with some basic forms of education can give valid and consistent information that positively influences water projects' sustainability in their locality.

Table 4.4 Level of Education

Level of Education	Frequency	Percentage
None	53	16.5%
Primary Level	164	51.0%
Secondary Level	80	24.8%
Tertiary level	13	4.0%
University level	12	3.7%
Total	**322**	**100%**

Source: Research Data 2020

4.3.4 Project Tenure

The study also sought to determine the number of years that the project had been in operation. The study sought to establish the number of years the beneficiaries have been members of their water project, and the findings showed that most of the respondents had been members of the project for less than five years with 69.3% followed by those between 6-10 years with 29.7% and lastly those above ten years with 1.0%. This result depicts that most water projects had a lifespan of less than five years and raised concerns on the sustainability of water projects in Narok South Sub- County.

Table 4.5 Project Tenure

Level of Education	**Frequency**	**Percentage**
Below 5 years	223	69.3%
6-10 years	96	29.7%
Above 10 years	3	1.0%
Total	**322**	**100%**

Source: Research Data 2020

4.4 Descriptive Statistics

This section contains descriptive results on independent variables and dependent variables. Descriptive statistical analyses were performed on community participation in; decision making, labor contribution, provision of non-financial materials, and financial contribution as the independent variables, sustainability of community water projects as the dependent variable. The descriptive analysis includes mean and standard deviations.

4.4.1 Sustainability of Community Water Projects

This section presents data analysis of the dependent variable. The dependent variable was community water projects' sustainability and was based on five participatory

variables namely, decision making, land contribution, non-financial materials, and financial contribution. The sustainability of water projects was accessed using numerous indicators that include; Willingness to pay for water, ability to deliver water tariffs on time, the ability of the project to meet emerging water demands, state of project infrastructure, and whether the project can perform schedule maintenance to name a few. The respondents were asked to provide answers on twenty items, each of which was captured on a 5-point Likert scale. Each item's mean was computed to determine the respondents' level of agreement, and the mean of means was calculated to assess the level of agreement the respondents had on the level of project sustainability. The results are shown in Table 4.6.

Table 4.6 Mean and standard deviation for Sustainability of Community Water Projects

No.	Item	Mean	Standard Deviation
1.	It is mandatory for all community members to pay for water.	2.69	1.563
2.	Community members can pay for water	3.42	1.124
3.	The community is willing to pay for water they are allocated.	4.02	0.861
4.	Payment for water by members of the community is made on a regular basis.	3.50	1.196
5.	Payment of water is made only by community members with the ability to pay for it.	3.76	1.095
6.	The project can sustain the communities' normal economic activities	4.46	0.714
7.	The extent to which an integrated approach to water management is being planned and put into practice is economical and represents the ''least-cost'' solution	3.97	0.769
8.	Project beneficiaries can pay for the implementation and maintenance of technologies of the projects	3.77	0.948
9.	As a result of the implementation of the project and its strategies, the income of some beneficiaries is immeasurably improved.	4.07	1.076
10.	The level of economic independence of this project is satisfactory	3.91	0.734
11.	Operations and maintenance of this water project depend on the community's ability to pay for water.	3.84	1.254
12.	The project beneficiaries are willing to pay for water and meet operation and maintenance costs over the next five years.	4.02	1.001
13.	Project team and members of the community can hire qualified professionals to conduct operation and maintenance of water projects	3.63	0.863
14.	Operation and maintenance of this water project is done only by community members with ability to pay for it	3.37	1.165
15.	I'm satisfied with the level of operations and maintenance the community contributes to the project success	3.45	1.083
16.	The project team owns this water project.	3.37	1.556
17.	Project team and members of the community jointly own the project.	4.35	0.699
18.	Community involvement in this water project activities creates a sense of ownership.	4.41	0.903
19.	Benefits realized by community members through this water project create in them sense of ownership.	4.35	0.736
20.	Community participation in water management creates a sense of ownership among them in the project	4.33	0.800

N=384 *Five-point scale: 1=strongly disagree; 5=strongly agree

Source: Research Data 2020

4.4.2 Community Participation in Decision Making

This section dealt with the influence of community participation in decision making on the sustainability of community water projects. Fifteen questions were used for

measurement of this variable, and each captured on a Likert scale. The coefficients used reflected on the project information, participation in planning, contribution in meetings, taking part in significant decisions, knowledge of members about important decisions, and control of members of choice of the project. The mean of each item was computed to establish the extent to which respondents agreed with the item's views. The mean of means was further calculated to identify the level of their participation in decision making. Table 4.7 shows that community authorization before the project commences had the highest mean of 4.30. “The initiation of this project reflected my involvement towards its initialization” had the lowest mean score of 3.13. The results obtained from the respondents are presented in Table 4.7

Table 4.7 Mean and standard deviation for community participation in decision making

No.	Item	Mean	Standard deviation
1.	During the initial stages of project implementation, information about the project was shared between the project team and the community.	3.8	1.047
2.	From the onset, the project team involved project beneficiaries in the initial study.	3.89	0.928
3.	The project team held for as in which individual community members involves shared their views	3.91	0.971
4.	Most community members were consulted before decisions in the initiation of the water project was made.	3.87	1.162
5.	I'm satisfied with the level of my involvement in information sharing in this water project.	3.43	1.303
6.	The community was adequately consulted before this water project was initiated.	3.99	0.911
7.	Community members' view on this water project was sought before its selection.	4.21	0.887
8.	The project team considered the community's views in selecting this project.	3.88	0.784
9.	Most members of the community were satisfied with their involvement in selecting this project.	3.32	1.064
10.	The project team sought my concurrence during project selection.	3.32	1.412
11.	The project team had an exclusive mandate in initializing this water project.	3.73	1.396
12.	This project required my authority to initiate.	2.63	1.350
13.	The initiation of this project reflected my involvement in its initialization.	3.13	1.291
14.	Community participation in the authorization of this community water project significantly contributed to its success.	4.30	0.822
15.	The level of community involvement in the initiation of this water project was satisfactory.	3.48	1.014
	Mean of Means	3.66	1.09

N=384 *Five-point scale: 1=strongly disagree; 5=strongly agree

Source: Research Data 2020

From the data collected, further analysis was conducted by calculating means of the 15 items that extricated community participation on decision making. The mean of means of the 15 items was 3.66. This shows that majority of the respondents were in agreement that they participated in decision making process of the community water projects. Participation in decision making process was enhanced by allowing the community to

give authorization before the project commences. Attendance to meetings and giving them chance to air their concerns during meetings gave them a sense of ownership

4.4.3 Community Participation in Labor Contribution

From the literature, it is noted that community contribution through labor contribution is closely linked with ownership and sustainability of community water projects. The level of Labor contribution was measured using fifteen items, each of which was captured on a Likert scale. These items were used to capture the respondent's level of participation in labor provision in all project cycles. The study findings found that, Community labour contribution significantly improved the project outcome and had the highest mean score of 4.26. However, the lowest mean score of 3.19 was for skilled labor is only offered by community members willingly. The results are presented in Table 4.8.

Table 4.8 Mean and standard deviation for community participation in labor contribution

Item	Mean	Standard deviation
The members of community were mobilized to contribute their own labour during project implementation.	4.03	0.919
Community labour contribution was necessary in project implementation process.	4.17	0.877
Community willingly contributed their own labour during project implementation.	4.07	0.917
Community labour contribution significantly improved the project outcome.	4.26	0.743
Community labour contribution at project implementation stage was satisfactory.	3.48	0.988
Community willingly assisted in transport of project construction materials to the project site	3.87	1.020
Community contribution in provision of transport services was crucial towards timely construction and operation of this project	3.95	0.881
The project team mobilized the community to contribute in provision of transport services	3.85	1.029
Transport services is only offered by community members willingly	3.37	1.173
The level of participation by community members in provision transport services was satisfactory	3.54	0.933
Plumbers and masons within the community provided their skilled labour during implementation of the project	3.96	0.974
Community members were mobilized to contribute skilled labour during all project cycles	3.94	0.982
Community skilled labour contribution significantly improved the project outcome.	4.20	0.990
Skilled labour is only offered by community members willingly	3.19	1.069
Community skilled labour contribution at project implementation and maintenance stage was satisfactory	3.28	1.088
Mean of means	3.81	0.972

N=384 *Five-point scale: 1=strongly disagree; 5=strongly agree

Source: Research Data 2020

The means of 15 items used to extract data regarding community participation in labor contribution were aggregated and used to calculate the mean of means which resulted to a mean of 3.81 and standard deviation of 0.972. This shows that majority of the respondents were in agreement that they participated in labor contribution.

4.4.4 Community Participation in Non-Financial Contribution

This was the third independent variable, community contribution through provision of Non-Financial materials was measured using fifteen questions. Table 4.9, shows that

Community contribution of land created sense of ownership of this project had the highest mean of 4.30 while on whether the level of contribution of local raw materials by the community was satisfactory in all cycles of this project had the lowest mean of 3.20.

Table 4.9 Mean and standard deviation for community participation in provision of Non-Financial materials

No.	Item	SA	A
1.	Community provided land where project was constructed and contributed part of their land to create way access the project	3.91	1.097
2.	Community contribution of land created sense of ownership of this project	4.30	1.118
3.	Community contribution of land was significant for the success of this project	4.05	1.014
4.	Land contribution towards support of the project is provided by the community willingly	3.97	1.057
5.	Community contribution of land to support this project was satisfactory	3.66	1.052
6.	Community members were mobilized to contribute non-locally available tools and equipment	3.97	0.925
7.	Provision of locally available tools and equipment significantly contributed to the success of this project	3.97	0.925
8.	Community members contributed local tools and equipment to support the project in all cycles of this project willingly	3.63	1.215
9.	Contribution of tools and equipment in support of this project created a sense of ownership among the community members	3.96	1.101
10.	I am satisfied with the level of use and utilization of local tools and equipment in implementation of this project	3.43	1.108
11.	Community members contributed sand, gravel, stones and other raw materials for constructing the project	3.90	1.151
12.	Contribution of locally available raw materials contributed to the success of this project	4.00	1.016
13.	Community members contribution of local raw materials created sense of ownership of this project	4.15	0.950
14.	Project team mobilized the community to contribute local raw materials towards support of the project in all cycles of this project	3.78	0.990
15.	The level of contribution of local raw materials by the community was satisfactory in all cycles of this project	3.20	0.942
	Mean of means	3.86	1.04

N=384 *Five-point scale: 1=strongly disagree; 5=strongly agree.

Source: Research Data 2020

This section was made up of fifteen items that was used to extricate information reflecting on community participation in provision of locally available non-financial

project's resources. The items included provision of gravel, sand, fencing poles, land for project construction and locally available tools and equipment. The results is indicated in table 4.9 indicated that respondents were in agreement that they participated in provision of locally available non-financial project resources with mean of means of 3.86.

4.4.5 Community Participation in Financial Contributions

This section consisted of fifteen items that was used to extract information on community participation in financial contribution. The items included information on cash towards administration, replacement, operation and maintenance. From the study, it was established that, the level of operation and maintenance is crucial for success of this water project with a mean of 4.64. In contrast, the findings also showed that majority of the respondents did not agree that prior to project implementation process, it was mandatory that community members contribute financially, with a mean of 2.32.

Table 4.10 Mean and standard deviation for community participation in financial contribution

No.	Item	Mean	Standard deviation
1.	The project team did not require community financial contributions.	2.77	1.660
2.	Prior to project implementation process, it was mandatory that community members contribute financially.	2.32	0.964
3.	Community contributed their own cash towards this water project implementation.	2.98	1.249
4.	My Financial contributions determined the success of implementation process of this water.	3.29	1.299
5.	Community Financial contributions during implementation of this water project was satisfactory	2.96	1.098
6.	Project beneficiaries are willing to contribute cash towards operations and maintenance of the project	4.15	0.769
7.	The level of operation and maintenance is crucial for success of this water project	4.64	0.618
8.	Efforts to cover operation and maintenance cost of this project through collection of user fees is always successful	3.58	1.001
9	Financial contribution towards operation and maintenance of this project resulted in economic independence of the project	4.30	1.071
10.	Community Financial contributions during operation and maintenance of this water project was satisfactory	3.42	0.998
11.	Availability of finance to meet replacement cost is crucial for the success of this project	4.56	0.962
12.	Prior to project implementation process, it was mandatory that community members contribute cash towards replacement finances	3.06	1.240
13.	Project beneficiaries are willing to give cash at any given time towards purchase of spares and replacement of water pipes when need arises	3.69	1.072
14.	I have contributed cash towards replacement of project water storage tanks	3.91	1.074
15.	Beneficiaries contribution of cash towards replacement costs was satisfactory	3.16	1.035
	Mean of means	3.52	1.074

N=384 *Five-point scale: 1=strongly disagree; 5=strongly agree

Source: Research Data 2020

The study computed the mean of the fifteen items used and found a mean of 3.52 and a standard deviation of 1.074. This indicates that most of the respondents agreed that they participated in contributing cash towards supporting the project.

4.5 Inferential Statistics

Inferential statistics are utilized in concluding the population at hand. In this study, Pearson's correlation coefficient was used to establish the relationship between the variables. Multiple linear regression was used to predict community water projects' sustainability using the four independent varibales, including community participation in; decision making, labor contribution, provision of land, equipment, non-financial materials, and financial contribution.

4.5.1 Correlation Analysis

Correlation analysis refers to a statistical measure used to assess the relationship between the study variables. This measures also shows the level of significance and the degree of the relationship that exists among the variables. According to Wong & Hiew, (2005), the correlation coefficient value ranging from 0.10 to 0.29 is considered weak, from 0.30 to 0.49 is considered medium and from 0.50 to 1.0 is considered strong. However, Field, (2005), opined that correlation coefficient should not go beyond 0.8 to avoid multicollinearity. Since a single construct in the questionnaire was measured by multiple items, the average score of the multi-items for a construct was computed and used in further analysis such as correlation analysis to examine the relationship between the variables (Wong & Hiew, 2005) and multiple regression analysis (Wang & Benbasat, 2007).

Table 4.11 presents correlation results of all the variables in the study. The association among Sustainability of community water projects, Labor contribution, provision of non-financial materials and financial contributions were significant at 0.01 levels. However, it was found that the association between and Sustainability of community water projects and decision making was not significant at 0.01. From the results, the correlation between sustainability of community water projects and community

participation in provision of non-financial materials was the strongest with r = 0.605, p-value, 0.01. Followed by the relationship between sustainability of community water projects and community participation in financial contribution r =0.549, p, 0.01, sustainability of community water projects and community participation in labor provision had a correlation of 0.458, p-value 0.01.

Lastly the relationship between sustainability of community water projects had a negative correlation of -0.019 and a p-value of 0.01. Since the highest correlation coefficient is 0.605 which is less than 0.8, there is no multicollinearity problem in this study (Table 4.11).

Table 4.11: Results for Correlation Analysis

	1	2	3	4	5
1. Sustainability of community water projects	1				
2. Community participation in decision making	-.019**	1			
3. Community participation in labor contribution	.458*	.224	1		
4. Community participation in provision of non-financial contribution	.605**	.177	.634	1	
5. Community participation in financial contribution	.549**	.145**	.415**	.577**	1

** Correlation is significant at the 0.01 level (2- tailed), * Correlation at 0.5 level (2- tailed).

Source: Research Data (2020).

4.5.2 Testing Assumptions of Regression Analysis

According to the regression assumption, the variables are normally distributed. The variables which are not normally distributed (highly skewed or kurtotic variables or variables with substantial outliers) can distort relationships and significance tests.

4.5.2.1 Normality test

A normality test is conducted to assess whether the data distribution is normal or "bell-shaped" with a mean of zero. According to Shapiro and Wilk (1965), the normality test

is essential in helping the researcher choose the appropriate test to undertake and ensure that normal distribution assumptions are not violated (Shapiro and Wilk, 1965).

The value of coefficient of determination R^2 Linear=0.456, as shown in figure (4.10), implies that the analyses' linearity assumption has been fulfilled. The coefficient of determination is 0.456, meaning that about 45.6% of the variation in community water projects' sustainability is explained by independent variables (decision making, Labor contribution, non-financial contribution, and financial contributions).

Figure 4.1 shows that the standardized regression residual is normally distributed whereby the observed and expected values were found along the line, without any significant departures from it, which implies that the assumption concerning normally distributed errors is assumed fulfilled (Fritsche, 2008). Normality test was also done by examining the skewness and kurtosis values. Skewness is used to measure the symmetry of a distribution while kurtosis is used to measure the peakness of a distribution (Tabachnick and Fidell, (2007). Based on the results, shown on table 4.9 the values of skewness and kurtosis revealed that the data was normally distributed where the skewness values were in the range of -.831 to -.063. On the other hand, the value for kurtosis was in the range of 1.709 to -0.056 well within the threshold of -2 to +2. Kolmogorov-Smirnova (K-S) and Shapiro-Wilk tests were conducted to test for the normality of sustainability of community water project as the dependent variable. These tests were applied to detect any departures from normality. From table 4.12, the Kolmogorov-Smirnova and Shapiro-Wilk statistics were .039 and .989 and, the associated p-values were .213 and .479 respectively. In summary, because the P-values were greater than the significance level (0.05) meaning the variables were normally distributed because it is not significant at $p<.05$.

Table 4.12 Normality Test Results (Kolmogorov-Smirnov[a]) for Dependent Variable

Factors	Kolmogorov-Smirnov[a]		Sha	
piro-wilk				
Statistics	df	Sig		Significance
	Statistics	df		
Sustainability of water projects	321	0.039		.479
.989	321			
P-value		.213		

4.5.2.2 Linearity Test

This test sought to assess whether variables are in straight line and identify any deviations from line of best fit. Linearity test was conducted graphically using normal Predicted Probability 'P-P' plot. Additionally, ANOVA test was also applied to assess linearity of the data.

Table 4.13 Linearity Test Results

Items	Linearity	Deviation from Linearity
Decision Making	.000	.547
Provision of Labor	.000	.470
Non-Financial Resources	.000	.213
Financial Resources	.000	.612

From the table above, it can be noted that the linearity values of the four variables were less than 0.05 which means that linearity assumption was not violated. Additionally, the values of deviations from linearity among all the four variables were greater than 0.05 meaning that the data were not deviating from linearity. Thus, from these results, it can be implied that the data used were linear.

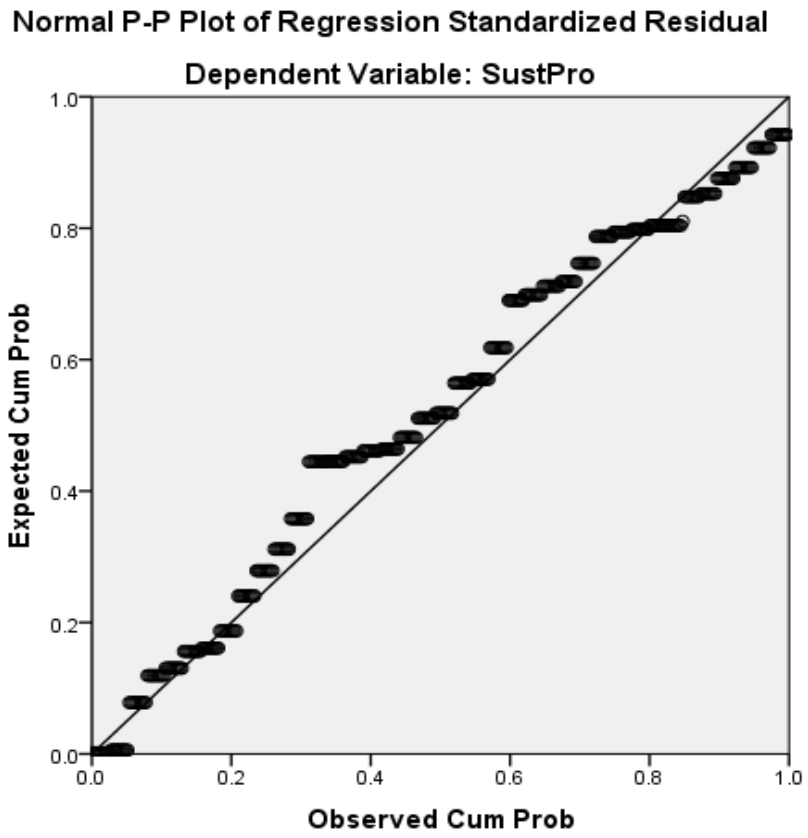

Figure 4.1 Linearity Test.

Source: Research data (2020).

From the observation of Fig. 4.1 Linearity Test plot, the data is scattered within the line of best fit, and this shows that the variables relationship is linear. Which satisfies linearity assumption of regression.

4.5.2.3 Test of Homoscedasticity

This test was done to verify that error terms had constant variances. Lavene test was conducted to confirm that variances were equal across samples (Homoscedasticity). In situations that the error term has differing variance, they are termed to be heteroscedastic. Therefore, Homoscedasticity of residuals of sustainability of community water projects was assessed using Lavene test. In this test, the null hypothesis is rejected if the significance level is below 0.05, and from Table 4.14 the Lavene statistics of 4.642 with an associated p-value of 0.000 was obtained. From this

result, it was noted that the probability of lavene statistics was less than 0.05 significance level and thus conclude that there is insufficient evidence to claim that there was unequal variance of the dependent variable, and it is concluded that there was homogeneity of variance.

Table 4.14 Test of Homogeneity of Variance

Lavene Statistic	df1	df2	P-value
4.642	5	321	.000

4.5.2.4 Test of Heteroscedasticity

This test is conducted alongside Homoscedasticity test. Lavene statistic is used to assess presence of heteroscedasticity. Once homoscedasticity test has been conducted and the values of error terms are found not to be constant, then it is said to be heteroscedastic. In this study, it was established from table above, Lavene statistics of 4.642 with an associated p-value of 0.000 was obtained which means that the variance of the dependent variable was equal and hence there was no heteroscedasticity.

4.5.2.5 Multicollinearity Test

The issue of multicollinearity arises when independent variables are correlated. This study examined the correlation matrix using Variance Inflation Facto (VIF) to detect multicollinearity. This VIF measures the severity of multicollinearity using in an ordinary least-squares regression analysis. VIF's of more than 10 indicates multicollinearity. The Tolerance for all the study variables were greater than 0.2, which indicates no multicollinearity among the study variables.

Table 4.15: Multicollinearity Test

Model	Standardized Coefficients				Collinearity Statistics	
	B	Standard error	t	Sig.	Tolerance	VIF
1 (Constant)	1.158	.219	5.290	.000		
Decision Making						
Labour-Contribution	-.145	.036	-4.072	.000	.946	1.057
Non-Financial	.155	.060	2.591	.010	.582	1.719
Contribution						
Financial	.341	.049	6.890	.000	.478	2.091
Contribution	.359	.056	6.468	.000	.662	1.510

Dependent variable: Sustainability of community water projects

Source: Research data (2020).

From the results above, it can be noted that none of the variables had VIF of more than 10, and thus, it is concluded that there was no multi-collinearity with the variables allowing all of the to be maintained in the regression model.

4.5.2.6 Independence of Residuals-Durbin-Watson Statistics

This test was done to detect the presence of autocorrelation. According to Chatterjee, Samprit, Simon off and Jeffrey (2013) precedence of autocorrelation makes predictors seem significant when they are not. Durbin-Watson value lies between 0 and 4 and the acceptable range is between 1.5-2.5. Field, (2009) reported that the value of 2 denotes no autocorrelation while 0 to 2 shows presence of positive autocorrelation and value greater than 2 indicates negative autocorrelation. From the results of Table 4.16, Durbin-Watson value was 2.123 which is within the acceptable range.

Table 4.16 Test of Independence (Durbin-Watson Statistics)

	R	R Square	Adjusted R square	Std. Error of the Estimate	Change Statistics				
					R Square change	F Change	df1	df2	Durbin-Watson
1	.675[a]	.456	.450	.57157	.543	70.349	4	317	2.123

a. Predictors: (Constant), Community participation in decision making, Community Participation in Labor Provision, Community Participation in Non-Financial Contribution and Community Participation in Financial Contribution.

b. Dependent Variable: Sustainability of Community Water Projects

4.5.2.7 Reliability Tests

The reliability of the questionnaires was tested using Cronbach alpha measurements. According to Cronbach's alpha, value should lie between 0.7 and 0.95 to be acceptable Hair *et al*, (2010). The result on table 4.17 indicates that the Cronbach's alpha and composite reliability values for all constructs surpassed the threshold value of 0.70, therefore establishing strong reliability among the measurements.

Table 4.17: Test Results for reliability

Construct	Number of items	Cronbach's alpha
Sustainability of Community Water Projects	20	.844
Community Participation in Decision Making	15	.799
Community Participation in Labor Contribution	15	.793
Community Participation in Non-Financial Contribution	15	.879
Community Participation in Financial contribution	15	.644
Overall items and their Reliability	**80**	**.919**

Source: Research Data, (2020)

4.5.2.8 Test for Factorability and Sphericity: Kaiser-Meyer-Olkin and Bartlett's Test

Factorability is a regression assumption that some correlations at least exist among the variables that enables coherent factors to be identified. Factorability of the items were

tested by examining Kaiser Meyer-Olkin Measure of Sampling adequacy and Barlett's Test of Sphericity. KMO statistics measures sampling adequacy, and KMO greater than 0.5 shows adequate sample (Hair *et al.,* 2013). Table 4.18 shows KMO statistics of 0.718 which is greater than accepted index of above 0.5 depicting that the sample was adequate for factor analysis.

Table 4.18 also shows Bartlett's test, which was used to determine the appropriateness of using factor analysis. Factor analysis is recommended suitable if Bartlett's test of sphericity has a p-value of less than 0.05 (Hair *et al.,* 2013). From the given table below, Bartlett's test of sphericity shows a chi-square of 4207.690 with an associated p-value of 0.000 which is meets the given threshold of probability less than 0.05. Thus, it was concluded that factor analysis was an appropriate approach for determining construct validity of the scale.

Table 4.18 Kaiser-Meyer-Olkin and Bartlett's Test

KMO and Bartlett's Test

Kaiser Meyer-Olkin Measure of Sampling adequacy		0.718
Barlett's Test of Sphericity	Approx. Chi-Square	4207.690
	Df	105
	Sig.	.000

4.5.3 Regression Analysis

The quantitative data were further subjected to regression analysis for the purpose of testing the hypothesis on this variable.

Hypothesis One: Ho_1: Decision making by community members has no significant influence on sustainability of water projects in Narok South sub-county in Narok County, Kenya.

Hypothesis one was tested using the model

1: $Y_1 = \alpha_0 + \beta_1 X_1 \ldots\ldots + \varepsilon$

Where;

Y_1 =sustainability of community water projects

X_1= Participation in decision making

α_0 = Y-intercept (the constant term)

β_1=The coeficient of the first independent variable

ε =error term

Table 4.19 Community Participation in Decision Making

	R	R Square	Adjusted R square	Std. Error of the Estimate	Change Statistics				
					R Square change	F Change	df1	df2	Sig. F Change
1	.060[a]	.004	-.010	.57157	.000	.188	1	316	.665

(a) Predictors: (Constant), Community Participation in Decision Making

Table 4.20 Coefficients of Community participation in decision making

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.902	.194		20.145	.000
	Community Participation in Decision Making	-.020	.047	-.022	-.433	.665

The model represented a path coefficient R^2 denting the proportion of variation in dependent variable explained by the regression model. From the table 4.19, community participation in decision making had a coefficient R^2 of -.010. Coefficient R^2 of -.010 shows that -1.0% variations in projects sustainability are accounted for by the influence in community participation in decision making. The regression equation explaining the relationship between the variables is given as; $Y_1= \alpha_0 + \beta_1 X_1 \ldots..+\varepsilon$ which resulted to $Y_1= 3.902-.022X_1+0.194$. This means that an incresase in participation of community in project decision making by one unit infuenced decrerased level of sustaibanility of water projects by -2.20%. From the data analysis, the signifigance level was found to

be .665 (P>0.001). Therefore, the findings supported the research hypothesis that community in decision making has not signifigant influnce on sustainability of water projects.

This findings conforms with the findings of Marks, Komives and Davis, (2014), which established that community participation in technical decisions has a negative influence on sustainability of water projects.

Hypothesis Two: Ho_2: Labor contribution by community members has no significant influence on sustainability of water projects in Narok South sub-county in Narok County, Kenya

$Y_2 = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$

Y_2 =Sustainability of community water projects,

X_2 =Participation in labor provision

Table 4.21 Community Participation in Labor provision

	R	R Square	Adjusted R square	Std. Error of the Estimate	R Square change	F Change	Change Statistics df1	df2	Sig. F Change
1	.484[b]	.234	.222	.50186	.230	113.297	1	315	.000

(a) Predictors: (Constant), Community Participation in Labor Provision

Table 4.22 Coefficients of Community Participation in labor provision

	Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	2.027	.245		8.276	.000
	Community Participation in Labor Provisions	.595	.056	.495	10.644	.000

Dependent variable: Sustainability of Community Water Projects.

The Table 4.21 shows that community participation in labor provision had a coefficient R of .484 while R^2 was 0.234. Coefficient R is 0.484 which shows a weak positive linear relationship between community participation in labor provision and sustainability of community water projects. The adjusted R^2 value of 0.222 also shows that 22.2% of variations in projects sustainability is explained by community participation in labor provision in Narok South sub-county. Therefore, the final model is given as; $Y=2.027+0.484X_2+0.245$.

From the results above, it is noted that hypothesis two that "community participation in labor provision does not having significant influence on sustainability of water projects" was statistically significant. Therefore, an increase in participation of community members in labor provision of one unit was found to influence an increased level sustainability of community water projects by 22.2%. From data analysis, it is further noted that community participation in labor provision significantly influenced sustainability of community water projects at 5% confidence level. ($p<0.001$).

Hypothesis Three: H_{03}: Contribution of Non-Financial materials by community members has no significant influence on sustainability of community water projects, the following model was adopted.

$Y_3= \alpha_0 +\beta_1 X_1+\beta_2 X_2+ \beta_3 X_3…..+\varepsilon$ where

Y_1 =sustainability of community water projects

X_3 =Participation in provision of land and Non-Financial materials

ε =error term

Table 4.23 Community Participation in provision of Non-Financial materials

	R	R Square	Adjusted R square	Std. Error of the Estimate	R Square change	F Change	Change Statistics df1	df2	Sig. F Change
1	.634[b]	.402	.391	.44404	.168	105.567	1	314	.000

(a) Predictors: (Constant), Community Participation in Non-Financial contribution

Table 4.24 Coefficients of Community Participation in provision of Non-Financial materials

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.738	.218		7.957	.000
	Community Participation in Provisions of land resources	.482	.047	.533	10.275	.000

Dependent variable: Sustainability of Community Water Projects.

From the data in table 4.23 X_3 the independent factor contributes to R=0.634, adjusted R^2=0.391. This shows that community participation in provision of land and non-financial materials account for 39.1% of the variation in the level of sustainability of community water projects.

Therefore, the simple regression equation Y= Y_3= $\alpha_0 + \beta_3 X_3 \ldots . + \varepsilon$ can be shown as Y= 1.738+ 0.634X_3+0.218. This means that an increase in participation of community in provision of land resources of one unitinfluenced an increased sustainability of community water projects by 0.634 units.

Hypothesis that community participation in provision of land and non-financial materials has significant influence on sustainability of community water projects was statistically significant. This translates to an increase in participation of community in provision of land and non-financial materials of one unit influenced an increased level of sustainability of community water projects by 63.4%.

Hypothesis Four: H_{04}: Financial contribution by community members has no significant influence on sustainability of community water projects, the following model was adopted.

$Y_3= \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 \ldots . + \varepsilon$ where

Y_1 =sustainability of community water projects

X_4 =Participation in Financial contribution

ε =error term

Table 4.25 Community Participation in Financial contribution

	R	R Square	Adjusted R square	Std. Error of the Estimate	R Square change	F Change	Change Statistics df1	df2	Sig. F Change
1	.679[e]	.461	.449	.42210	.059	41.112	1	313	.000

(a) Predictors: (Constant), Community Participation in Financial contribution

Table 4.26 Coefficients of Community Participation in Financial contribution

	Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	1.129	.228		4.942	.000
	Community Participation in Financial contribution	.357	.056	.300	6.412	.000

Dependent variable: Sustainability of Community Water Projects.

From Table 4.25 X_4 the independent factor contribute to R=0.679 adjusted R^2 =0.449. This means that community participation in financial contribution account for 44.9% of the variation in the level of sustainability of community water projects.

Therefore, the simple regression equation $Y=Y_4 = \alpha_0 + \beta_4 X_4 \ldots . + \varepsilon$ can be repleced as $Y=1.129+0.679X_4+0.228$ which implies that an increase in participartion in cash provision of one unit influenced an inncreased in sustainability of community water projects by 0.679 units.

Hypothesis that community participation in financial contribution does have signifigant influence on sustainability of community water projects was statistically signifigant.

This translates to mean that an increase in participation in financial contribution of one unit influenced an increased in sustainability of community water projects by 67.9%.

Table 4.27 Model Summary

	R	R Square	Adjusted R square	Std. Error of the Estimate	R Square change	F Change	Change Statistics df1	df2	Sig. F Change
1	.675[a]	.456	.450	.42187	.456	70.347	4	317	.000

(a) Predictors: (Constant), Financial contribution, Contribution in Decision making, Labor Contribution, Non-Financial Materials Contribution

(b) Dependent Variable: Sustainability of Community Water projects

The results obtained in Table 4.27 shows that the entire model was statistically significant in predicting sustainability of community water projects and this is shown by F statistics of 79.347 and p value of < 0.05. Therefore, it is concluded that the entire model was a good fit. Hence community participation in decision making, labor provision, provision of non-financial materials and equipment, and financial contribution are good predictors of sustainability of community water projects.

Table 4.28 Analysis of Variance

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	56.486	4	14.122	79.347	.000[b]
	Residual	67.452	379	.178		
	Total	123.938	383			

Dependent Variable: Sustainability of community water projects
Predictors: (Constant), Decision Making, Labor Contribution, Non-Financial contribution, Financial contribution

Table 4.29 Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		Sig.
		B	Std. Error	Beta	t	
1	(Constant)	1.158	.219		5.290	.000
	Community Participation in Decision Making	-.145	.036	-.159	-4.072	.000
	Community Participation in Labor Contribution	.155	.060	129	2.591	.010
	Community Participation in Provision of Non-Financial Contribution Materials	.341	.049	.378	6.890	.000
	Community Participation in Financial contribution	.359	.056	.301	6.468	.000

Dependent variable: Sustainability of Community Water Projects.

Table 4.28 presented that joint community participation contributes R=.675. The simple regression equation $Y_5= \alpha_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3+\beta_4X_4…..+\varepsilon$. This can represented as;

$Y=1.158 -0.159X_1 + 0.129X_2 + 0.378X_3+0.301X_4+0.219$

Joint community participation influence on sustainability of community water projects:

$Y_5= \alpha_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3+\beta_4X_4…..+\varepsilon$

Where, Y_5=sustainability of community water projects

X_1=Participation in decision making

X_2=Participation in labor contribution

X_3 =Particpation in provision of non-financial materials

X_4=particpation in provision of cash

An adjusted R square of 0.456 shows that joint community particpation in descision making, labor provision, non-financial materials and financial provision contribute 45.6% of sustainability of community water projects. This joint contibution results in

more influence as compared to one facet of the project. This is consistent with the findings of Muniu, Gakuu and Rambo, (2017) using descriptive studies on sustainability of community water projects in Nyeri County.

The results indicated that, the contribution of joint participation to sustainability of community water projects is more than contribution of an independent variable. This is because, participation in decision making, labor contribution, non-financial materials and Financial contribution were -1.0%, 22.2%, 39.1% and 44.9% respectively compared to joint participation with 45.6%

4.5.4 Summary of Hypotheses testing

The formulated hypotheses (4) in this study were tested at 5% significance level. The beta coefficients from the results of regression equation analysis show the slope that explains the relationship between dependent, moderating and independent variables. The coefficient size shows the magnitude of influence.

Table 4.30: Summary of hypotheses tests results

	Hypothesis	Beta	p-values	Remarks
H_{01}	Decision-making by community members has no significant influence on water projects' sustainability in the Narok South sub-county in Narok County, Kenya.	-.022	0.656	Fail to reject
H_{02}	Labor contribution by community members has no significant influence on the sustainability of water projects in Narok South sub-county in Narok County, Kenya.	.495	0.000	Rejected
H_{03}	Non-financial contribution by community members has no significant influence on water projects' sustainability in the Narok South sub-county in Narok County, Kenya.	.533	0.000	Rejected
$H0_4$	Financial contribution by community members has no significant influence on water projects' sustainability in the Narok South sub-county in Narok County, Kenya.	.300	0.001	Rejected

Source Research Data (2020) ***Note,*** *sig at p<0.001*

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

It focuses on summarizing the study findings, giving conclusions and recommendations according to the study objectives and hypotheses. The aim of this study was to assess how involving the community members in community water projects cycles in Narok South Sub-County influences sustainability. Specifically, the study investigated the influence of community participation on decision making, labor provision, non-financial, and financial contribution on the sustainability of community-based water projects. This section also contains the contribution to body of knowledge.

5.2 Summary of Findings

Overview of study findings on the relationship between dependent and independent variable.

5.2.1 Influence of Community Participation in Decision Making on Sustainability of Community Water Projects

The motive of this study was to determine how community involvement in decision making regarding water projects relate with sustainability of such projects. The findings revealed that majority of the community members participated in decision making. It was established that, community members took part in decision making, and this involvement was enhanced by household; consultation, taking part action initiation and information sharing on major project decisions. Respondents from all the water projects agreed that they were engaged in authorization of their water project with a mean of 4.30 and standard deviation of 0.822. This was also echoed on whether their views were incorporated before the project was selection. Community members agreed that their views were sought before selection of their community projects and that the community

was able to identify their needs. Additionally, respondents agreed that they participated in airing grievances regarding the challenges facing the community and suggested viable solutions. This was shown by an agreement of community members that they adequately consulted before their water project was initiated with a mean of 3.99 and standard deviation of 0.911. However, the study findings showed that community involvement making decisions in project cycles did not significantly influenced sustainability of community-based water projects. Community involvement in making decisions in project cycles had a coefficient R^2 of -.010. This implies that community involvement in making project decisions results in a negative linear relationship with project sustainability. This conforms to what other scholars had found, which implies that community members should not participate in technical decisions making of the project.

5.2.2 Influence of Community Participation in labor provision on Sustainability of Community Water Projects

The study determined the influence of community members or project beneficiary's participation in labor provision on sustainability of community-based water projects. The results showed that community participation in labor provision significantly influenced sustainability of community water projects. The community members should take part in clearing project sites, provision of skilled labor and transport services. The findings showed that participation in labor provision significantly influenced sustainability of community water projects at 5% level of significance ($p<0.001$). The study established that an increase in participation of community in labor provision of one-unit increased sustainability of community water projects by 0.484 units.

5.2.3 Influence of Community Participation in Provision of Non-Financial Materials on Sustainability of Community Water Projects

The study established that community member contributed various non-financial materials towards the support of the project in varying extents. The study established that community participated in provision of non-financial materials in forms of land for constructing the project, gravel, building stones, sand, and equipment's to name a few. Majority of the respondents agreed that community contribution of land created sense of ownership of this project with a mean of 4.30 and standard deviation of 1.118. On the other hand, most of the respondents agreed to have contributed local raw materials and they this enhances the success of the projects with a mean of 4.15 and standard deviation of 0.950. Community members also agreed that they contributed sand, gravel, stones and other raw materials for constructing the project. The study demonstrated that community participation in provision of land, non-financial materials and equipment had a significant influence on sustainability of community-based water projects with 5% level of confidence ($p<0.000$).

5.2.4 Influence of Community Participation in Financial contribution on Sustainability of Community Water Projects

The study established that the community members contributed cash towards the support of the project. It was established that community participation in financial contribution was depicted by households' contributions of cash towards; paying cash for water, monthly contribution towards operations and maintenance, cash towards administration costs and replacement costs among others. Majority of the respondents agreed that the level of operation and maintenance of the project is crucial for its success with a mean of 4.64 and standard deviation of 0.769. Additionally, most of the respondents were in agreement that that availability of finance to meet replacement cost

is crucial for the success of this project and that financial contribution towards operation and maintenance of the project resulted in economic independence of the project with mean of 4.56 and 4.30 with standard deviations of 0.962 and 1.071 respectively. The study established that majority of project beneficiaries are willing to contribute cash towards operations and maintenance of their projects. The research findings showed that community involvement in financial contribution had a significant influence on sustainability of community-based water projects at 5% level of significance ($p<0.000$).

5.3 Conclusions

Water is the primary driver of sustainable development. Development requires water within the health, industrial, energy, and food sector among others. However, the lack of water resources especially in the semi-arid areas requires water projects to act as the backbone of economic and social growth and development within such communities. There is a great need to protect and preserve such resources, which mainly depends on knowledge, funding, legislation, and technology to ensure that the sustenance of water projects within communities is effective.

In summary, it was the study findings established that sustainability of community water projects can be achieved through participatory of project beneficiaries. The participatory approach aims at the inclusion of the local populations within communities in development efforts. It is thus the engagement of the rural people in the development efforts within their setting. The idea is thus the empowering of the local people in projects of development to benefit them (Kapoor 2002). As such, it is employed in the hopes that the participation of the people will solidify sustainable development, and thus it will be more successful if there is effective engagement. The approach has been widely adopted by many organizations around the globe as an

alternative measure and principle to the mainstream development strategy of "top-down."

This study aimed at investigating influence of community involvement in community-based water projects and sustainability of those projects. The study achieved this objective by breaking down community participation into participation in; decision making, labor contribution, provision of land, non-financial materials and equipment and financial contribution. The study findings established a moderate positive correlation between the independent variable (community participation) and the dependent variable (sustainability of community water projects).

The first objective of the study was to establish how community involvement in deciding the direction of project cycles initiatives had an influence on sustainability of water projects. The findings indicated a weak negative linear influence of community involvement in decision making on sustainability of water projects. Therefore, from this observation, the more community members participate in decision making (which included, action initiation, attendance and contributions in project meetings, information sharing) contributed to a decrease in sustainability water projects. This is because involving community members who doesn't have sufficient technical knowledge in hydrology and civil requirements of water bodies will compromise the project.

The study also established that, community involvement in labor provision had a positive influence on sustainability of water projects. From the study, it is noted that the community participated in mobilizing labor for the project, which includes skilled labor, clearing site, transport services, digging trenches and laying pipes and maintenance of the project site. The study further noted that this type of participation created sense of ownership among the project beneficiaries and hence boosting project

performance and eventually leading to project sustainability. Thus, it was noted that increasing community involvement in labor contribution resulted in an increase in sustainability water projects.

The study also demonstrated that community participation in provision of land, non-financial materials influenced sustainability of community-based water projects. The findings indicated a moderate positive linear relationship between community involvement in provision of land, non-financial materials and equipment and sustainability of community water projects. This participation came in form of provision of; land, local equipment, pipes, and mechanical machineries among others.

Additionally, the study sought to assess the relationship between financial resources provision sustainability of community-based water projects. The study found out that financial contribution had a moderate positive linear relationship with sustainability of community water projects. This kind of participation included; membership fees; cash towards costs, water tariffs, and maintenance fee among others. It was further noted that an increase in participation by the community in financial contribution assisted the project in providing initial project capital, operation and maintenance, and replacement costs. This resulted in boosting project performance and eventually leading to project sustainability.

The study also noted that when community participation is considered jointly, there was more influence on sustainability of community-based water projects than when participation was considered singly. Finally, as Kapoor (2002) identifies, the participatory hygiene and sanitation transformation method involves an approach in which the local rural people can assess and understand their current situations and thus develop ways to improve the behaviors or factors resulting from such situations. As

such, techniques like mapping are especially instrumental in the analysis and discovery of the current situations of the community.

Similarly, the developed solutions and intervention measures are only long-lasting and effective if they take into account the specific needs of the stakeholders, who also include the local communities in which the projects are set. As Narayanasamy (2009) identifies, according to a research conducted in Lockyer Catchment in Australia, Ross, and Baldwin, the researchers, stressed that the application of an action research methodology and techniques of building consensus, to water projects in communities, is effective in minimizing the number of conflicts and also leads to cooperation and trust among the various parties and stakeholders.

5.4 Recommendations

1. The study established that community participation is crucial in ensuring project sustainability, therefore it is crucial to involve community members in all project cycles. It was noted that there are various capabilities of the project beneficiaries, and if they take part in all project endeavors, their capabilities can be utilized towards achieving project sustainability. This means that any water project initiative targeting communities should ensure communities participate and take an active role in project deliberations.
2. Non-Financial resources, skills knowledge and expertise should be utilized during implementation of community-based water projects. When community members contribute the aforementioned resources, it was noted that it creates sense of ownership among the community members, and therefore enhancing sustainability of the projects.
3. The study also established that Financial contribution among the community members is crucial in management and maintenance of the project. Financial

contribution by community members helps in providing the project with finances use in operation and maintenance, replacing broken pipes, administration costs, paying of electricity and other utilities consumed by the project. Financial contribution by community members therefore helps the project to be self-sustaining and hence prevent overdepend3ence on government and other donor agencies for operation.

4. The study findings showed that joint community participation portrayed more influence on sustainability of water projects compared to when the variables were used singly. Therefore, this study recommends that community should jointly participate in provision of labor, transport services, cash, land, and other non-financial and financial resources.
5. Additionally, according to the findings, community participation in decision making should be strictly monitored to ensure that community members does not take part in technical decision making to avoid compromising technical information that should be based on deciding establishment and operation of the water project.

5.5 Suggestions for Further Studies

1. Future study should consider a moderating variable of community dependency syndrome when conducting future studies on community participation and sustainability of community-based water projects.
2. Future study should also explore the effectiveness of using Public Private Partnership (PPP) in delivering community water projects in rural areas.
3. Most communities had a challenge in assessing some of project sites to collect water due long distance and expensive water or electric pumps, therefore, future

studies should explore effectiveness of solar pumps in community water projects.

5.6 Contributions to Body of Knowledge

This sought to determine the relationship between community participation in; decision making, labor contribution, provision of non-financial and financial contribution independently and jointly influence sustainability of community water projects. From the reviewed literature, most of the studies only focused on community participation as whole and without splitting into specifically participation in decision making, labor provision, non-financial materials provision, and cash provision. Previous studies did not specifically explain why community should participate in project decision making and yet they may lack technical expertise. Additionally, previous studies did not show consensus on the influence of various types of participation on sustainability of community water projects. This study hence provides a significant contribution to body of knowledge having established new findings as given below.

The findings of this study concur with the main model under which the study was anchored on. The study was underpinned in Asset Based Community Development (ABCD) model. According to the model, community development initiatives should be 'people-centered' and 'citizen-driven' approach which also is in line with the principles of Dublin International Conference on Water and the Environment (ICWE), (1992) that provided that community water development projects and management needs to be anchored on a participatory approach, involving users, planners, and policy-makers at all levels (ICWE), 1992). The findings of this study indicated that community participation in all phases of community-based water projects give chance to community members to exercise their democratic right in selection, implementation and management of water projects and programmes that solve their problems. The study

further established that community members have useful resources that should be harnessed to improve sustainability of community water projects.

The study revealed that involving community members in decision making portrays a negative influence on sustainability of water projects. This was in line with the empirical findings of the study communities may not have the requisite technical expertise to take part in technical decision making. Therefore, project beneficiaries should only take part in management-related decisions, and not in technical decisions. Additionally, the study empirically revealed that the depth and not breadth of labor contribution is what enhances the sustainability of water projects.

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APPENDICES

Appendix I: Work Plan

Activities in Months	Jan 15-Feb 15	Mar 15 – April 15	April 15 – May 15	May 15 – June 15	June -15
Concept development and defense					
Proposal development and defense					
Pre-test instrument					
Data collection					
Data coding and entry					
Data analysis					
Writing draft report					
Thesis defense					
Submit final thesis					

Appendix II: Budget

No.	Particulars	Amounts – Kshs.	Amounts - Kshs
1	Proposal Preparation		
	Literature research	3,000.00	
	Printing Reference Research Proposal	5,000.00	
	Printing Research Proposal	2,000.00	
	Stationery	3,000.00	13,000.00
2	Other expenses		
	Travelling expenses	8,000.00	
	Photocopies of questionnaire	1,500.00	9,500.00
3	Actual Data Collection.		
	Photocopy of questionnaires	4,500.00	
	Daily Subsistence Expenses	30,000.00	34,500.00
4	Data Processing	3,000.00	3,000.00
5	Binding: Final Project	10,000.00	10,000.00
	Grand Total		**80,000.00**

Appendix III: Questionnaire for Narok South Communities who are Beneficiaries for the Selected Projects

Introduction

This questionnaire is intended to collect data on the influence of community participation on sustainability of community water projects in Narok South Sub-County, Kenya. Information collected will be used for academic purposes only and it is hoped that the study findings will make significant contributions towards participatory design of community water projects in Kenya. The information collected will be handled with confidentiality and academic professionalism. Please fill in the information as directed in the various sections provided.

SECTION A: SUSTAINABILITY OF COMMUNITY WATER PROJECTS

This section contains items on sustainability of community water projects. Please respond appropriately inserting a tick (√) against the value of the number you think best represents your answer given as; Strongly agree (SA)= 5, Agree(A)=4, Neutral(N)=3, Disagree(D)=2, Strongly disagree (SD)=1

No.	Item	SA	A	N	D	SD
	a. Quantity and quality of water	**5**	**4**	**3**	**2**	**1**
1.	The project has the room to meet emerging water demands					
2.	The project provides continuous flow of water on regular basis					
3.	The project provides water free of dirt and germs					
4.	The project provides satisfactory water service					
5.	The water project is able to satisfactorily function over the next 5 years					
	b. Project Utilization and Maintenance					
1.	The water pipes and tanks are always in good working condition					
2.	The project has capacity to carry out major repairs on time					
3.	The project always performs routine maintenance on time					
4.	The current project staff has the required training to discharge their duties					
5.	The project performs satisfactory operation and maintenance of water points					
	c. Financial independence					
1.	Water project is able to pay workers' salaries on time.					
2.	Water project is able to pay electricity utility expenses on time					
3.	Water project is able to pay for treatment chemicals on time					
4.	Water project is able to pay the required licenses and tariffs on time					
5.	Community members are able to continue paying for services provided by water project					
Mean score						

SECTION B: DECISION MAKING BY COMMUNITY

This section requires you to answer questions on community participation in decision making in terms of project design, control over project decision making, contributions in meetings and in choice of project representatives. Please show how you agree with the following statements by circling the number you think applies to your answer. Strongly agree (SA) = 5, Agree (A) =4, Neutral (N) =3, Disagree (D) =2, Strongly disagree (SD) =1

No.	Item	**SA**	**A**	**N**	**D**	**SD**
	a. Information Sharing	**5**	**4**	**3**	**2**	**1**
1.	Community members were informed about major decisions influencing community water projects					
2.	All stakeholders were provided with the crucial information regarding the project plans					
3.	All documents containing project information were made public to all members					
4.	Project beneficiaries holds regular meetings every year					
5.	Project beneficiaries makes informed choices regarding project decisions					
	b. Consultation					
1.	Community members attended meetings of community water project					
2.	Beneficiaries talked and made contributions during the project meetings					
3.	Community members have control over major decisions of community water projects					
4.	Decisions made by the project committee reflect the views of community members.					
5.	Project beneficiaries are consulted on every action taken by project officers					
	c. Action Initiation					
1.	I was informed of the plans to initiate/revive the project					
2.	I took part in planning of water project					
3.	My contributions influence project initiation					
4.	Community participation in action initiation was satisfactory					
5.	Project beneficiaries approved all decisions on community water projects before they are implemented					
Mean score						

SECTION C: LABOR CONTRIBUTION BY COMMUNITY

This section requires you to answer questions on the influence of community participation in provision of labor in terms of clearing projects' sites, transport services and professional skills and sustainability. Please show how you agree with the following statements by circling the number you think applies to your answer.

Strongly agree (SA) = 5, Agree (A) =4, Neutral (N) =3, Disagree (D) =2, strongly disagree (SD) =1

No.	Item	SA	A	N	D	SD
	a. Clearing Sites	**5**	**4**	**3**	**2**	**1**
1.	I participated in clearing project sites					
2.	Project beneficiaries always ensure project site is clean					
3.	Clearing project site significantly improved project outcome					
4.	Beneficiaries contribution in clearing sites is necessary for efficient operation and maintenance of the project					
5.	Beneficiaries participation in clearing sites were satisfactory					
	b. Transport Services					
1.	I participated in transportation of construction materials					
2.	I participated in transportation of project machineries					
3.	Beneficiaries participation in transportation service was satisfactory					
4.	The project team mobilized beneficiaries to contribute in provision of transport service					
5.	Beneficiaries willingly participated in provision of transport services during project implementation					
	c. Skilled Labor					
1.	Project beneficiaries takes part in fewer technical tasks including regular maintenance checks					
2.	I assisted to mobilize labor in all project's cycles					
3.	Project beneficiaries participated in skilled repairs of water project system					
4.	I participated in laying project pipes and machineries					
5.	Project beneficiaries skilled labour contribution was satisfactorily					
Mean score						

SECTION D: NON-FINANCIAL CONTRIBUTION BY COMMUNITY

This section contains items on influence of community participation in provision of Non-Financial materials and sustainability. Please show how you agree with the following statements by circling the number you think applies to your answer.
Strongly agree (SA) = 5, Agree (A) =4, Neutral (N) =3, Disagree (D) =2, Strongly disagree (DS)=1

No.	Item	SA	A	N	D	SD
	a. Land Provision	**5**	**4**	**3**	**2**	**1**
1.	Community contributed land for construction of community water project					
2.	Community provided land for constructing water storage tanks					
3.	I have allowed community water project to construct water pipes through my land					
4.	The land where the project is located can serve the project satisfactorily					
5.	Contribution of land by project beneficiaries significantly contributed to project success					
	b. Contribution of Locally Available Equipment					
1.	Some of the equipment used during construction of community water projects were contributed by the community members					
2.	It was mandatory for beneficiaries to mobilize all the requisite tools and equipment project construction before implementation					
3.	Contribution of local equipment significantly resulted in project success					
4.	Local equipment significantly help in project operation and maintenance					
5.	Contribution of locally available raw equipment was satisfactory during all project stages					
	c. Contribution of Local Raw Materials					
1.	Community member contributed sand, gravel and stones for constructing the project					
2.	The community contributed poles for fencing the project's site					
3.	It was mandatory for project beneficiaries to contribute local raw materials for the project during implementation					
4.	Contribution of local raw materials significantly resulted in project success					
5.	Contribution of locally available raw materials was satisfactory during all project stages					
Mean score						

SECTION E: FINANCIAL CONTRIBUTION BY COMMUNITY

This section contains items on influence of community participation in provision of financial resources in terms administration finance, operation and maintenance and replacement finances on sustainability of community water projects. Please show how you agree with the following statements by circling the number you think applies to your answer. Strongly agree (SA) =5, Agree (A) =4, Neutral (N) =3, Disagree (D) =2, strongly disagree (DS) =1

No.	Item	SA	A	N	D	SD
	a. Administration finance	**5**	**4**	**3**	**2**	**1**
1.	I contributed cash to towards initial development of community water project					
2.	I contributed cash for payment of project worker's salaries					
3.	Project beneficiaries are able to meet project's administration cost function over the next 5 years					
4.	Project administration costs did not require community Financial contribution					
5.	My Financial contributions towards project administration costs contributed to project success					
	b. Operation and Maintenance finance					
1.	Beneficiaries contributed money towards operation and maintenance of community water project					
2.	I contributed cash to facilitate the operation of the project					
3.	Efforts to cover operation and maintenance costs through collection of user fees is successful					
4.	Project beneficiaries are able to meet project's operation and maintenance costs over the next 5 years					
5.	Cash contributed by beneficiaries towards operation and maintenance were satisfactory and resulted in project success					
	c. Replacement finance					
1.	I contributed cash to purchase projects spare parts					
2.	I contributed cash towards replacement of project's storage tanks					
3.	Project beneficiaries are able to meet project's replacement costs over the next 5 years					
4.	Beneficiaries contribution of cash towards replacement costs was satisfactorily					
5.	Prior to project implementation it was mandatory that beneficiaries contribute cash towards replacement finance					
Mean score						

SECTION F: ADMINISTRATION

1) Name of the community water project…….

2) When was the project started…….

{Please tick appropriately (√) in the space provided in the brackets} below.

3) Gender {Please tick your appropriate gender (√) in the space provided in the brackets}

Male [ ] Female [ ]

4) Please tick the range within which your appropriate age falls Bracket {Please tick one (√)}

21 – 25 Years[ ] 26 – 30 years [ ] 31 – 35 years [ ] 36 – 40 years [ ]

41 – 45 Years [ ] 46 – 50 years [ ] 51 – 55 years [ ] over 55 years [ ]

5) Please tick your highest level of education attained {Please tick one (√)}

None [ ] Primary [ ] secondary [ ] Tertiary [ ]

University [ ]

Other if any (specify)

……
……

6) What is your current occupation	1=Farming	[ ]
	2=Employed	[ ]
	3=Casual Labor	[ ]
	4=Business	[ ]
	5= Others (specify)	
7) What is your approximate monthly income	1= 5000 and below	[ ]
	2= 5001- 10,000	[ ]
	3= 10,001 – 15,000	[ ]
	4= 15,001 – 20,000	[ ]
	5= 20,001- and above	[ ]

Appendix IV: Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Ref No: **924817**

Date of Issue: **18/March/2021**

RESEARCH LICENSE

This is to Certify that Mr.. Kipkorir Langat Langat of Moi University, has been licensed to conduct research in Narok on the topic: Community Participation and Sustainability of Water Projects in Narok South Sub-County, Kenya for the period ending : 18/March/2022.

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