FACTORS INFLUENCING SUSTAINABILITY OF COMMUNITY WATER PROJECTS: A CASE OF KITUI WEST SUB COUNTY, KITUI COUNTY

BY

ELIZABETH WAIRIMU MUNYUI

A Research Project Report Submitted in Partial Fulfillment for the Award of Degree of Master of Arts in Project Planning and Management of the University Of Nairobi

2015

DECLARATION

This research project is my original work and has not been submitted to any University or any other institution for any academic award.

Signature Date

Elizabeth Wairimu Munyui

REG NO: L50/70026/2013

This research projectl has been submitted for examination with my approval as the University supervisor

Signature Date

Dr. Mulwa Angeline

Lecturer, Department of Extra Mural Studies

DEDICATION

This study is dedicated to my lovely son Felix Muturi and my mother Nancy Munyui for their support, encouragement and understanding throughout the research period.

ACKNOWLEDGMENTS

The preparation of this research project took the effort of various persons. First many thanks are due to my supervisor Dr. Angeline Mulwa for ensuring timely guidance whenever needed making it possible for me to be through with this study within the required period of six months for Master of Arts Degree research project. I am very grateful to her.

I am also grateful to my student colleagues at (University of Nairobi -Kitui Centre), for their assistance in discussions which helped in developing my research project report. This study could have been too tasking without their tireless support.

I am also grateful to all the study participants who were involved in the activities of this study and assisted in making the study a success. I greatly acknowledge them for their support and willingness to spare some of their limited time and use it to make this research project successful.

Above all, I thank the Almighty God for his guidance provision and protection throughout the study period.

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ABBREVIATION AND ACRONYMS

ANOVA	Analysis of Variance
APMs	Area Pumps Mechanics
ATPS	African Technology Policy Studies
CBOs	Community Based Organizations
CPW	Community Water Project
FGD	Focused Group Discussion
GOK	Government of Kenya
MDG	Millennium Development Goals
NGOs	Non-Governmental Organisation
O &M	Operations & Maintenance
SSA	Sub Saharan Africa
UN	United Nations
UNICEF	United Nations Children's Fund
VLOM	Village Level Operations and Maintenance
WHO	World Health Organisation
WSP	Water and Sanitation Program
WUAs.	Water Users Associations

ABSTRACT

More than a billion people in developing world are vulnerable to access on daily basis, a reliable source of clean water. The national governments and Non-Governmental Organization have invested large sums of money over years developing community water projects to address the problem of accessibility of water, but the aspect of sustainability of the water projects is left in the hands of the community resulting to high failure rates of these projects. In order to make the investments in water supplies more effective, failure rates of these projects should be reduced. The Purpose of this study was to investigate the factors influencing sustainability of community water projects in Kitui West Sub County in order to make appropriate recommendations for enhancing sustainability of community water projects. The study was guided by the following objectives; establish how community participation influenced sustainability of community water projects, assess how technology influenced sustainability of community water projects, establish extent to which management skills influenced sustainability of community water projects, and find out how financial factors influenced the sustainability of community water projects. The study used descriptive survey research design. Data for the study was collected using closed ended questionnaires, interviews and Focused Group Discussion. The questionnaires were administered to 195 respondents, interviews were conducted to 2 government officials and 3 Focused Group Discussions were held with community management groups. The collected data was analysed and presented using descriptive statistics in form of frequency tables and Multiple Regression Analysis to establish the relationship between the variables. The study established that sustainability of community water projects in Kitui West Sub County was being influenced though differently by community participation, technology, management and financial factors. The research also established that Managerial training of management committees, managerial capacity of management committees, technical training of management committees and financial support for payments of operations and maintenance services significantly influenced sustainability of community water projects in Kitui West Sub County. The study recommends that policy makers should formulate policies aimed at addressing capacity building of management committees in terms of managerial and technical aspects. Policy makers should also formulate policies to address sustainable financing of operations and maintenance of community water projects.

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

The recognition by the UN Assembly, in 2010, of water and sanitation as a human right provides impetus towards the ultimate goal of providing everyone with access to safe and clean water (WHO, 2010). According to latest estimates by WHO and UNICEF Joint Monitoring Programme (JMP) for water supply released in 2013, 36% of word's population (2.5 billion) lack improved sanitation facilities while 768 million people still use unsafe drinking water sources. Inadequate access to safe water coupled with poor hygiene practice kills and sickens thousands of children every day and leads to impoverishment and diminished opportunities for thousands more (WHO/UNICEF 2013).

There are more than one billion people in developing world that are vulnerable to access, on daily basis, a reliable source of clean water. The challenge of water for all has taken on renewed interest through the declaration of Millennium Development Goals (MDG) with specific target of reducing by half the population of people without sustainable access to safe water by 2015 (United Nations 2000). Progress has been made towards meeting the water supply needs for the world's poor; for instance, in 2012, 79% of the population of the developing countries had access to improved water supplies, bringing up the total world coverage to 83%. (WHO/UNICEF 2008). With over 75% of Africa's poor living in rural areas, the need to expand sustainable water services to these areas is imperative (De.Regt 2005). Access to rural water supply remains low in Kenya. Small community based water providers are seen as part of the solution and are supported by the reforms of Water Act of 2002, which introduced the regulatory and tariff reforms. However, these small community based water projects lack enough funding to improve the existing systems. (GOK, 2009).

Cartel et.al (1999), defines sustainability as constancy in water and sanitation services which may be achieved through evolving and adaptive mechanism, thus the environment, development and long term functionality and reliability of services serve as boundaries for distilling the key components of sustainability. In relation to the above statement, a close examination of the Kenya's community based development leaves no doubts that

sustainability is a challenge. This is evident in most of the rural development projects that have been undertaken over time with little impacts afterwards despite the resources used.
Kitui County has inadequate water for both domestic and agricultural use. The rainfall is inadequate and unreliable while majority of the rivers are seasonal. Majority of the population depend on surface and sub-surface dams, water pans/earth dams, shallow wells and boreholes. The county depends on small community water schemes which are managed by community water committees.

Community managed water supply systems play a key role in providing water services to the communities. However, many community managed water supplies in Kitui continue to under-perform and require support in terms of infrastructure improvement, strengthening of management and financial system, operations and maintenance and better inclusion of community (UNICEF, 2012). These projects have been developed by the Non-Governmental Organizations and national government but the aspect of sustainability of the projects is left in the hands of the communities, there are no policies in place guiding the community on technical or financial support /assistance in order to ensure sustainable management of the water projects. This situation poses the question of sustainability of such water projects (UNICEF, 2012). It is due to this scenario that the study is intended to be carried out in order to assess the factors influencing sustainability of community water supply projects in such rural settings.

Effective operations and maintenance (O &M) of rural water supply system is a critical element for the sustainability of water project. Community management of rural water supply systems on operations and maintenance (O&M) may fail to succeed if financing resources are not available and frequent supports are not provided. (Binder, 2008). Budgeting for sufficient funding for rural water supply systems is an important issue for sustainability and proper maintenance. (Niyi et al, 2007).

1.2 Statement of the Problem

In developing countries, national and regional governments, local and international NGOs and other concerned organisations invest large sums every year for the implementation of

rural water supply projects (Gebrehiwot, 2006). However, construction of water projects may not bring about sustainable change if they fail after a short time. In order to make these investments in water supplies more effective, failure rates of these systems should be reduced. Research has shown that rural water supplies in sub Saharan Africa often demonstrate low levels of sustainability (Gebrehiwot, 2006). According to Niyi et. al (2007), among the key causes of low levels of sustainability include; lack of technical backstopping, unsustainable financing mechanism, low levels of adoption of advance technologies, inadequate knowledge and skills, lack of proper involvement of community in the project implementation and poor project management systems for the water projects. Technological innovation is a key factor that contributes to sustainability of community water projects.

In Kenya, like other sub Saharan African countries, inadequate technologies have threatened the survival of many community water projects. These community water projects lack essential equipment like hand pumps to ensure that water is pumped to reach all the community. These projects still use technologies that are too expensive to maintain increasing their operations and maintenance (O &M) costs. These projects are also faced with the challenge of Non-Revenue Water and illegal connections. These factors coupled with inadequate management skills and inadequate financing of community water projects poses a great threat to the sustainability of these projects (UNICEF, 2012).

Access to water in Kitui County has been disadvantaged owing to the limited endowment with water resources. Supply of water to communities has remained quite low translating to low access to clean water in the Sub County. Households with access to clean potable water are estimated at 35% while that with access to piped water is about 19% in the whole county. (GoK, 2009). Generally the distances to water points are long ranging from 7km to 20 km since there are no reliable water sources. Majority of the population depend on surface and sub-surface dams, water pans/ earth dams, shallow wells and boreholes. Kitui West Sub County therefore largely depend on small community water schemes which are managed by community water committees (GoK, 2013). Community managed water projects in Kitui West continue to underperform and require support in terms of infrastructure improvement,

strengthening of management and financial systems, operations and maintenance and inclusion of community (UNICEF, 2012).

Despite the immense importance of community water based projects in ensuring access to clean drinking water for all, limited study has been done locally and internationally in Kitui West sub county, Kitui County to establish the factors influencing sustainability of community water projects. This study therefore was to establish the factors influencing sustainability of community water projects. The study focused on community participation, technology, management skills and financial factors and their influence on sustainability of community water projects.

1.3. Purpose of the Study

The study was aimed at establishing the factors influencing sustainability of water supply projects in Kitui West Sub County, Kitui County.

1.4. Objectives of the Study

i. To establish how community participation influence sustainability of Community Water Projects (CWP) in Kitui West Sub County.
ii. To assess the influence of technology on sustainability of Community Water Projects in Kitui West Sub County.
iii. To establish the extent to which management skills influence the sustainability of Community Water Project (CWP) in Kitui West Sub County.
iv. To find out how the financial factors influence sustainability of Community Water Projects in Kitui West Sub County.

1.5. Research Questions

The following research questions were used to guide this study.

i. To what extent does the level of community participation affect the sustainability of Community Water Projects in Kitui West Sub County?
ii. How does technology influence sustainability of Community Water Projects in Kitui West Sub County?

iii. To what extent do management skills affect the sustainability of Community Water Projects in Kitui West Sub County?

iv. How do financial factors influence sustainability of Community Water Projects in Kitui West Sub County?

1.6. Significance of the Study

The study may be important to several players in water provision sector including; the County Government Directorate of Water, Development partners in the water sector, Water Services Providers, Community Managed Water Projects, Water Users Association and individuals in addressing issues of community participation, management skills, technology and financial factors in water provision to ensure sustained water projects. The County Government may take the necessary steps in providing the required support to community managed water projects through involvement of the community in prioritization and implementation of water supply projects, provision of technical, institutional and management support to the water supply management committees and adequate funding/subsidies to community water projects in order to ensure sustainable water supply projects. The county Government may also formulate policies that will guide on sustainability of water supply projects. The study may be important to the development partners involved in development of water resources by informing them on the need to enhance sustainability of community water projects after donor support is withdrawn.

1.7. Limitation of the Study

Study limitations such as time and finance constraints were anticipated while conducting the study. The limitation of time constraint was overcome through engaging research assistants and working for longer hours to hit the threshold time limit. Extra funds were sourced with minimization of costs to overcome finance constraints.

1.8. Delimitation of the Study

The study was designed to investigate the factors influencing sustainability of Community Water Projects. The study focused on a sample of 195 households in Kitui West Sub County. The study also focused on the following four main factors and their impacts on sustainability of Community Water Projects, these are; community participation, technology, management skills and financial factors. The data collected in this study will be generalized with caution to other sub counties in Kenya and/or the rest of countries of the world, since Kitui West Sub County might have unusual characteristics that may influence the findings. However, the results will be significantly generalized in most of the other parts in Kenya and elsewhere as long as the parts have nearly similar characteristics to those in Kitui West Sub County. The results may also be used for comparison between results obtained from studies in other sub counties in Kenya or other countries of the world.

1.9. Assumptions of the Study

The study was based on the following assumptions;

i. The respondents were familiar with factors influencing sustainability of water supply projects.
ii. The respondents were representative of the target population that are mainly served by community water supply.
iii. The respondents would cooperate and give honest and accurate responses.
iv. The researcher's data collection would not in either way influence the participant's response.

1.10. Definition of Significant Terms used in the Study.

Sustainability. Sustainability refers to a community water project that is functional, providing reliable access to water to the community and is able to meet the operation and maintenance cost for a prolonged period of time. A water service is sustainable if the water sources are not over-exploited but naturally replenished, facilities are maintained in a condition which ensures a reliable and adequate water supply, the benefits of the supply continue to be realized by all users indefinitely, and the service delivery process demonstrates a cost-effective use of resources that can be replicated.

Community Water Projects. Community Water Projects (CWP) refers to a water supply project which is operated and maintained by the community established structures.

Appropriate technologies. Appropriate Technologies refers to technologies that can be adopted and used in the community water projects considering technological, environmental, social factors among others.

Operation and maintenance. Operation and maintenance (O & M) refers to the activities undertaken to operate, run, maintain or keep the community water project in good working conditions

Community Participation Community participation refers to communities assuming responsibilities for their own welfare and developing capacity to contribute to their own and community development. It also refers to involvement of or contribution by the community towards implementation of projects.

Management Skills Management skills refer to using expertise in coordinating desired goals and objectives using available resources efficiently and effectively.

1.11. Organization of the Study

This study was organized into five chapters. Chapter one describes the introduction of the study which includes the background of the study, statement of the study, the purpose of the study, the research objectives, and the research questions. The section also highlights the significance of the study, the basic assumptions, the limitations and delimitations of the study and the definition of significant terms.

Chapter two describes the literature review of the study and was sub divided into the following sections; introduction, description of themes of all the objectives, the theoretical frame work, the conceptual framework and the explanation of relationship of variables in the conceptual framework.

Chapter three gives the research methodology which includes the introduction, research design, description of the target population, sample size determination and sampling procedure. The chapter also described the data collection methodologies, validity and reliability of the data collection instruments, data collection procedures, data analysis techniques, ethical considerations and finally the operational definition of study variables.

Chapter four present data analysis, interpretation, presentation of data collected and discussion of the findings. The data was analysed, interpreted and presented using frequency distribution and multivariate analysis. Chapter five gives the summary of findings, conclusions, recommendations and suggestions for further research.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter consist of introduction, description of the factors influencing sustainability of community water projects according to the objectives of the study; influence of community participation, technology, management skills and financial factors on sustainability of community water projects.

2.2 Influence of Community Participation on Sustainability of Community Water Projects

Most rural water supplies in sub-Saharan Africa are community-based. That is to say, most water systems are owned, operated and managed by a community. User communities must therefore be granted true decision-making authority. This means that they should be given comprehensive information needed to make informed decisions, without being pressured to follow the preferences of the facilitator. Communities and households should be free to select technology and service levels that suit them. They should also be free to select the most appropriate management system for operation and maintenance (O&M), including the option not to manage this themselves (Harvey and Reed, 2004). The importance of community participation in rural water supply is often emphasized and if used appropriately has great potential to contribute to sustainable water supplies. Community participation in sustainable water supplies include the following: prioritization and vocalization of community needs, Selection of appropriate facilities, technologies and locations, financial contribution to capital costs, provision of labour for construction of systems and facilities, management of operation and maintenance, setting and collection of water tariffs, and physical maintenance and repair activities(UNICEF, 2012).

Effective community demand is the foundation for understanding and prioritizing community and household water and sanitation needs. This component is fostered by a demand-responsive approach and related participatory Planning methods that result in systems based on what individuals want, what they are willing to pay for, and what they are able to sustain (Montgomery et.al, 2009). In contrast, supply driven approaches are often associated with a

lack of funds for operation and maintenance, and may disproportionately benefit wealthier individuals who are better connected (politically and physically), and therefore, more likely to receive services (Jenkins and Sugden, 2006). Community participation (including the simplest level of involvement) from as early as problem identification enhances the future sense of ownership, but ongoing motivation is required for continuing participation (Batchelor et al., 2000). This is of key importance; just because a community has participated in the planning process does not mean that it will sustain participation in ongoing service delivery. Community participation does not automatically lead to effective community management. Community participation is a prerequisite for sustainability, that is, to achieve efficiency, effectiveness, equity and replicability (UNICEF, 2012). Good governance at the community level during the project cycle is positively correlated with a more sustained water supply. It is important that community-based organizations (CBOs), such as water committees, are trusted and respected by general members of the community if they are to be effective.(IRC, 2002).

2.3 Influence of Technology on Sustainability of Community Water Projects

Rural water supply provision in Sub-Saharan Africa (SSA) is typified by low cost, simple technologies which can be operated, maintained and financed by poor rural communities or households. The choice of technology for improved water supplies, dependent on environmental, socio-economic and political conditions, includes; protected springs, hand pump equipped boreholes and wells, rainwater harvesting, hand-dug wells, gravity-fed systems and small-scale pumped systems (Harvey and Reed, 2004). There is no single technology option which can be used in all situations and each technology has specific advantages and limitations. Financial implications are important, both in terms of initial costs to the donor and community, and recurrent costs. In general, financial responsibility for ongoing operation and maintenance (O&M) of water systems lies with the user community. It is therefore essential that O&M costs are within the financial means of the users. Appropriate technical skills, tools and spare parts are also required to facilitate maintenance and repair. Whatever technology is selected, some level of O&M activity is necessary. There is an increasingly popular school of thought that the more simple the technology, the less the O&M requirements and the more sustainable it is likely to be (Lockwood, 2004). While this

is generally true, 'simple' technologies may not always be appropriate due to lack of user acceptability or restrictive environmental conditions. The choice of technology in any particular situation is limited by the environment and in particular the water sources that are available locally. Many areas of SSA have few natural springs, and populations have traditionally relied on surface water or shallow groundwater (Harvey and Reed, 2004). Groundwater provides potable water to an estimated 1.5 billion people worldwide daily and has proved the most reliable resource for meeting rural water demand in sub-Saharan Africa This is primarily because of the relative ease of access to water that does not usually need treatment prior to drinking (DFID, 2001).

Dynamic operation and maintenance is based on clear benchmarks of performance that allows for adaptations in hardware and software based on changing technologies, user demand and economics. This component relies on establishing clear responsibilities that may be held by the community, an external provider or through a collaborative arrangement (Harvey and Reed, 2007). Dynamic operation and management also includes establishing supply chains, conducting monitoring and evaluation, and collaborating with internal and external organizations for ongoing technical training and support, as well as hygiene and sanitation advocacy (Harvey and Reed, 2004). Insufficient financial planning and lack of spare part suppliers are two major barriers to dynamic operation and maintenance. Managers of rural systems without sufficient know-how and training may grossly underestimate recurrent and future costs (Harvey and Reed, 2004). This can result in unreliable service and inefficient use of initial investments. Lack of easily accessible replacements for commonly broken well and pump components in rural areas compounds the problem of insufficient financial planning, and results in straight forward repairs requiring weeks or months to complete (Oyo, 2006; UNDP-WSP, 2006).

Appropriate technology choice cultivates effective community demand by providing consumers with information about the potential water supply and sanitation solutions that consider local technical capacity and are suitable for local environmental, cultural, and economic conditions (Jenkins and Scott, 2007). Adoption of appropriate technology is key in sustainability of community based water projects as it eases operations and maintenance of

the project. Sustainability has become a concern of all community projects. At the same time technology is developing at a blinding speed and is becoming the principal instrument for meeting this concern. Most community projects are therefore investing large amount of money in implementing information systems. However, the advantages offered by technologies especially in terms of enhancing productivity depend upon how well these technologies are integrated into the project objectives (Harvey and Reed, 2004). Technical innovations have enormous influence on community based projects. Technological innovations should also be an important factor influencing improvement of performance and therefore ensuring project sustainability (Nohria and Gulati, 2006).

2.4 Influence of Management Skills on Sustainability of Community Water Projects.

The traditional approach to rural water supply in Africa has been that of a project with a finite life span. This is convenient for external donors and implementing NGOs but conflicts with the very principle of sustainability. A water supply is a service and any service requires ongoing management. The focus on the facility or static infrastructure detracts from the importance of managing and maintaining a water service, which is a dynamic process (Harvey & Reed, 2004). Many government strategies stipulate that rural water services should be community-based. This means that communities select a water supply technology, of which they become owners, are involved in its implementation and are responsible for managing the operation and maintenance of their chosen technology (they may or may not actually conduct maintenance themselves). This assumes that communities are; given a range of technologies and information in order to make an informed choice, willing and able to manage O&M (this may mean that they use a third party to actually carry out maintenance and repair) and willing and able to finance the cost of O&M in the long-term (UNICEF, 2012).

These three criteria are prerequisites for sustainable community management and yet they are not often investigated fully before a water supply initiative commences, despite rhetoric to the contrary. Communities are rarely provided with sufficient information and options in order to make an informed decision regarding technology choice, and hence their willingness and ability to manage and finance O&M on a long-term basis is not firmly established.

Community based organizations (CBOs) usually take the form of committees which lack legal status, meaning they are often unable to take legal ownership of systems and facilities (Harvey, 2006). Some community-based water services have demonstrated some high levels of sustainability, but this is only the case where there is a strong institution (government or NGO) in place to support community management committees. If policies are to continue promoting community management, they must also recognize the necessity for institutional support if water services are to be sustainable. (Harvey and Reed 2007).

2.5 Influence of Financial Factors on Sustainability of Community Water Projects.

Access to safe, sufficient and affordable water in rural Africa will not increase unless sustainable financing strategies are adopted which ensure the sustainability of existing water services (Harvey, 2006). There is therefore a strong need for international donors and national governments to develop practicable long term financing mechanism. Community financing mechanism to ensure sustainable payment of tariffs must be matched to specific community and their economic characteristics. Innovative strategies are also needed to ensure that rural poor are adequately served for which a realistic, targeted and transparent approach to subsidy is required (Harvey, 2006). The development approach adopted in Sub Saharan African countries has provided a convenient concept to abrogate responsibilities for long term service provision from implementing agencies, be they Non-Governmental Organizations NGOs), Bilateral agencies or governmental authorities to poor rural communities. The presumption that once a new water supply is constructed and handed over to the user community it can be sustained by community financing of operations and maintenance (O & M) is over-simplistic since long term O & M costs are neither calculated nor communicated to water users (Harvey, 2006). Rehabilitation and extension investment needs of most water projects are not funded. Sustainable management of water supply systems requires recurrent investments to maintain and expand access and service quality; rehabilitation, expansion of production capacity and distribution network (WSP, 2010).

Sustainable financing mechanisms need to consider O&M and longer-term rehabilitation needs. This is essential if systems are to remain operational indefinitely. Implementers should strive to instill in users a sense of the need to pay for a water service. The emphasis must be

shifted from paying for maintenance of a facility to paying for the provision of safe, adequate and accessible water. This concept of paying for water may be difficult to instill in water users in poor rural communities, but has the potential to remove many barriers to sustainable community financing. If rural water services are to be sustainable the following three categories of cost must be calculated and funded: direct O&M costs; institutional O&M costs (including monitoring and evaluation), rehabilitation and expansion costs. Ideally, water tariffs should cater for future system upgrade, rehabilitation and expansion costs as well as ongoing O&M costs. Currently, this occurs very rarely. One of the main constraints to this is the need for a transparent, secure and sustainable method of storing and investing money for future use. Community-managed financing mechanisms are rarely able to fulfil these requirements (Harvey and Reed, 2004).

In the interests of efficiency, effectiveness, equity and replicability (i.e. sustainability) it is now generally accepted that rural communities and users should finance the cost of running their own water supplies. It is also commonplace for communities to be expected to contribute to the initial cost of their chosen technology or system. This inevitably places considerable responsibility on the shoulders of the users and makes community financing a crucial issue in the quest for sustainable rural water services. It is also essential, however, that communities trust those who are responsible for providing services (Harvey and Reed, 2004). It is essential that both existing and new rural water services are sustained before ambitious coverage targets can be considered. One of the main reasons for poor levels of sustainability is prevalence of unacceptable, unaffordable or impracticable financing strategies (Cartel, Tyrrel and Howsam, 1999).

2.6 Theoretical Framework.

This study will be based on the community management model, sometimes known as 'Village Level Operation and Maintenance' (VLOM) The community management model is based on the well-intentioned principle of encouraging ownership and empowering communities. It also acts as a convenient concept for shifting responsibility for ongoing operation and Maintenance, and hence sustainability of services from facility-provider to end

user. Community 'sensitization' or 'mobilization' is designed to instill a sense of ownership and responsibility (Harvey and Reed, 2004).

The model is the most common partnership approach adopted in sub-Saharan Africa. In the model the government acts as enabler and is responsible for regulation, facilitation and monitoring of sector stakeholders. The term facilitation refers to the provision of an environment in which stakeholders are able to operate with minimal constraints. This may involve information provision, follow-up training and technical support. The private sector is responsible for implementation and CBOs are responsible for the management and financing of O&M. Actual O&M activities may be conducted by the private sector, such as Area Pump Mechanics (APMs) or community volunteers. Community management models require dynamic management and leadership at all levels and it is important that government recognizes the need for effective facilitation and ongoing support to CBOs (Harvey and Reed, 2004). The underlying principle of the model is to encourage local communities to take responsibility for the sustainable management of water supply schemes limiting external interventions to provision of regulatory framework, technical support and institutional support (Harvey and Reed, 2004).

2.7 Conceptual Framework

Conceptual framework is a graphical/narrative of the relationship of the study variables network, where the independent variables interact with moderating, intervening and extraneous variables, and the outcome/output is the dependent variable (Orodho, 2005).This is shown in Figure 1.

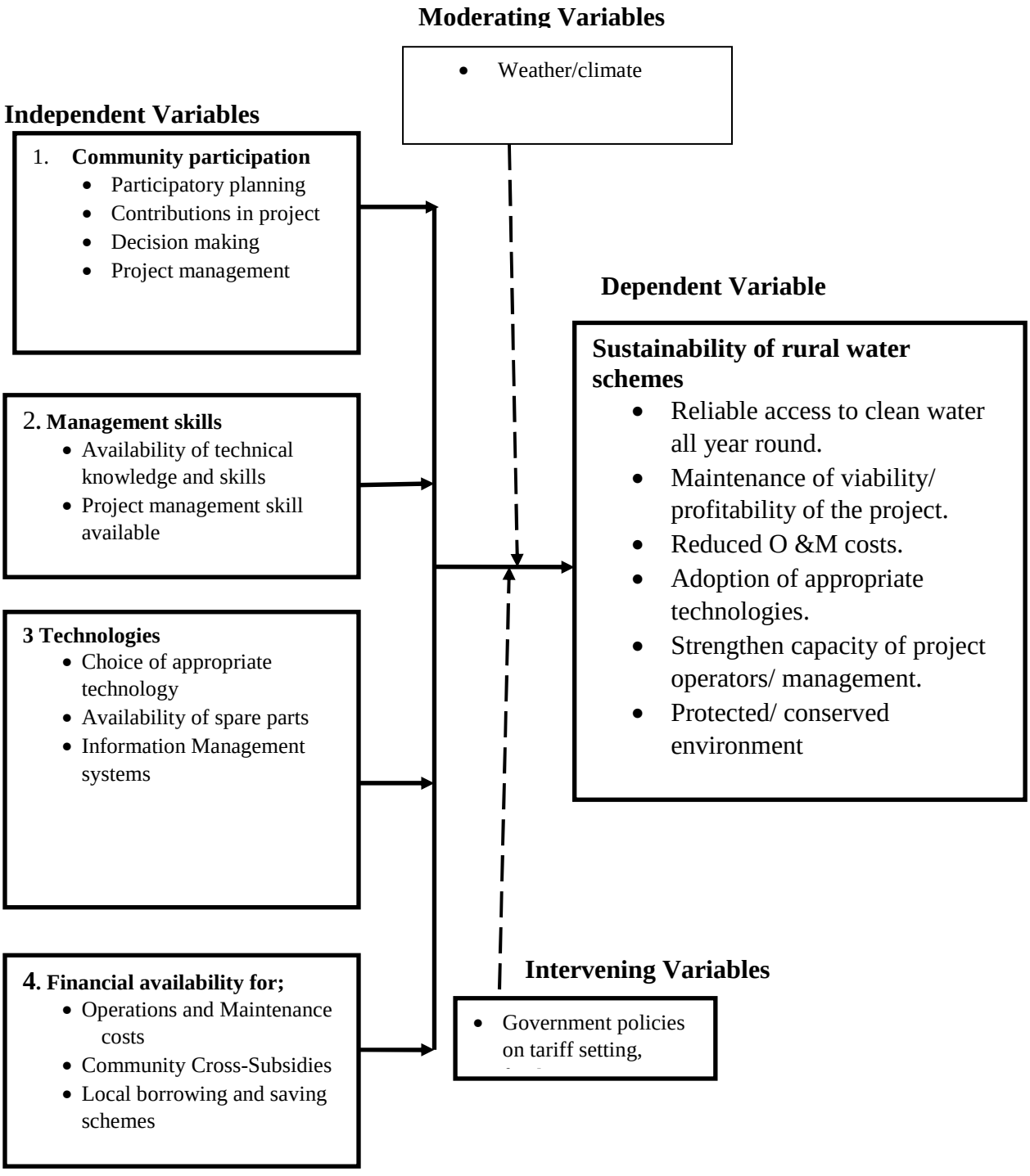

Figure 1. The Conceptual Framework for sustainability of community water projects.

Community participation is key in sustainability of community water projects. The level of participation in project planning and implementation has tremendous impacts on ownership and sustainability of such projects. Government policy does not provide clear guidelines on the level of participation of community on community water projects. Intensive participatory planning would result to better management of community water projects/schemes that would consequently increase the community's ability to sustainably manage their projects, indigenous knowledge is valued and local priorities taken into considerations. Access to appropriate technologies, operations and maintenance services, spare parts and availability of financial resources have proven to be key factors in enhancing sustainability of community water. Providing financial support for technical operations and maintenance services could be one of the ways of enhancing sustainable management of community projects. Community water projects management committees often lack financial support for technical operations and maintenance of projects. Policy guidelines on financing of community water projects and training of management committees can lead to long term sustainability of community water projects.

2.8 Summary of Literature Review and Research Gaps.

In summary the literature reviewed provided an analysis of key factors of sustainability of community managed rural water schemes such as community participation, technology, management skills and financial factors. The major gaps noted in the literature review is that most studies have done minimal assessment on community participation and management of community water projects and their influence on sustainability of rural water schemes. There is also limited literature on sustainability of water supply systems in Arid and Semi-Arid Lands in Kenya.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology that was used in the study and was further sub divided into the following sub sections; research design, description of target population, sample size and sampling procedures, description of data collection instruments, methods of determining validity and reliability of research instruments, data collection procedures, ethical considerations in the study and finally the operational definition of variables.

3.2 Research Design

The study used descriptive research design to investigate the factors influencing sustainability of community water projects. Munyoki and Mulwa (2012) notes that a descriptive study aims at generating knowledge that may be used to describe or develop a profile of what is being studied. Descriptive study is described by Mugenda and Mugenda (2003) as a study that seeks to obtain information that describes existing phenomena by asking individuals about their perceptions, attitudes, behaviors and values. The study used descriptive study in order to establish descriptive roles and also examined relationships between study variables. It was quick and relatively cheap to carry out. Descriptive study was also adopted because it could be carried out for a study constrained by time.

3.3 Target Population

The study targeted community water schemes such as boreholes, Earth dams, shallow wells and pipeline extensions serving the population of Kitui West Sub County. The target population was drawn from the four wards in Kitui West Sub County: Mutonguni, Kwa Mutonga/Kithumula, Matinyani and Kauwi wards. The estimated numbers of community water project (boreholes and shallow wells) in Kitui West sub county were 40 serving a population of about 17, 103 households. The target household was clustered according to their wards. The study participants were household heads or any other family member available and could provide the required information and 3 committee members per community water scheme who were involved in management, operations and maintenance of the community water project

3.4 Sample Size and Sampling Procedures

The section describes how the sample size of the study was determined and the sampling procedure that was used to select the subject of the study.

3.4.1 Sample Size

Munyoki and Mulwa (2012) define a sample as a subset of the study population and must be representatives of the population. Mugenda and Mugenda (2003) recommends a big sample for a study where resources and time allows, However, resources and time are the major constrains in many studies requiring smaller samples to be used. The sample size for the study was calculated using the formula $n=N/ (1+N (e)^{2})$ where n was the sample size, N was the target population (17, 103) and e was the level of precision which is 0.05 for social sciences. The sample size from the calculation was 391 household but due to the homogeneity of the target population half the sample size was considered. A sample size of 195 households was selected for the study. 40 community water projects were selected for the study where 3 committee members per water project were selected.

3.4.2 Sampling Procedure.

The study used simple random sampling to select households from the 4 wards in Kitui West Sub County. Simple random sampling was also used to select management committees from the 4 wards. The study used purposive sampling to select community water project committee involved in functional projects that have been sustained for long with minimal external support. Purposive sampling was also used to select high yielding water project which are functional for focus group discussions.

3.5 Data Collection Instruments

The study collected both qualitative and quantitative data. The study used questionnaire, Focused Group Discussions (FGD) and interview guides to collect data. Structured questionnaire with close-ended questions were used to collect information from households and interview guides with structured questions were used, particularly to gather information from government officials and other key players supporting community water project.

Focused Group Discussions were conducted to collect information particularly from water project management committees.

3.6 Validity and Reliability of Research Instruments

This section describes how validity and reliability of the research instruments used in data collection was upheld.

3.6.1 Validity of Research Instruments.

According to Munyoki and Mulwa (2012) validity is a measure of the extent to which an instrument measures what the researcher intends to measure. They noted that validity deals with how accurately data obtained represents the variable of the study. They also noted that content validity is a measure of the degree to which data collected using a particular instrument represents a specific domain of indicators of a particular concept. Content validity of the research instruments was determined by experts in research methodology and looked at the coverage of specific areas (objectives) covered by the study. The researcher pre-tested the research instruments with 10 households from Kauwi ward in order to standardize the research instrument and address issue of ambiguity but the data was not used for the study. The study used more than one method in data collection to validate the results.

3.6.2 Reliability of Research Instruments

Reliability is a measure of the degree to which a research instrument yield consistent result after repeated trials (Munyoki and Mulwa, 2012).They further noted that reliability is a contributor to validity. Munyoki and Mulwa (2012) also noted that reliability is concerned with the estimates of the degree to which measurement is free of random or unstable error. To establish the reliability of the instruments, Split-half method was used during pre-testing. The questionnaires were administered on a random sample of ten households. The participants were not included in the actual study sample. The data values were split into two halves using the odd-even item numbers divide, and then correlated using Pearson Product-Moment Correlation Coefficient and resubmitted to Spearman Rank Correlation Coefficient. The correlation coefficient results were 0.79 and was considered sufficient for the questionnaire to have high reliability.

3.7 Data Collection Procedures

Data collection was undertaken by the researcher and research assistants recruited from the local community. A researcher authorization permit was sought from National Commission of Science, Technology and Innovations, an introductory letter was obtained from the University and notification was made to the County Department of Water of the intention to conduct the research. This also involved training the research assistants and reviewing of the research instrument together. Pre-testing of research instrument was done to ensure the appropriateness of the instruments. Corrections noted during pre-testing were incorporated in the final research instrument. Questionnaires were administered personally by the researcher and by the research assistants to households and management committees of the community water projects. Key informants interviews were conducted with government officials and other key players in the water sector. Focused group discussions were held with community water management committees who were involved in management and operations of these water projects.

3.8 Data Analysis

Completed questionnaires were edited for completeness and consistency and followed by coding and tabulation of the data in order to detect any anomalies in the responses. Descriptive statistics in form of frequency distributions tables and percentage were used to establish the general characteristics of the study sample. Multiple RegressionAnalysis was then used to determine the relationship between dependent and independent variables and their significance. The descriptive statistical tools SPSS Version 16.0 was used for data analysis.

3.9 Ethical and Logical Considerations of the Study

Confidentiality and privacy of the respondent were ensured in the study through anonymous identity of respondent (not using their names while filling the questionnaires). Voluntary and informed consent of participants was sort before administration of the questionnaire, before conducting FGD or key informant interviews. The participants were also informed of the purpose and benefits of the research.

3.10 Operational Definition of the Variables

To achieve the objectives of the study on the investigation of factors influencing sustainability of community water projects in Kitui West Sub County, Kitui County which were; the influence of community participation, management skills, technology and financial factors on sustainability of community water projects, data was collected using a questionnaire, Focused Group Discussions and interview guide shown in Appendices 2, 3 and 4. Operationalization of the study variables has been illustrated in Table 3.1.

Table 3.1 Operationalization of Study Variables

Objectives	Variables		Indicator(s)	Measurement	Level of scale	Tools of Analysis
	Independent	Dependent				
To establish influence of Community participation on sustainability of community water project	Influence of Community participation	sustainability of community water project	-No. of community members involved in project Implementation. -Community contribution towards the project.	-Level of involveme of community -level of ownership of projec	-Interval -Nominal -Ordinal	**Descriptive Statistics** -Frequency distributions -Percentages -Multiple Regression Analysis
To establish influence of management skills on sustainabilit of community water project	Influence of management skills	sustainability of community water project	-Highest qualificatio and training -Technical/manageria skills/experience	-Level of education/ training -Level of experience skills and knowledge	-Interval -Nominal -Ordinal	**Descriptive Statistics** -Frequency distributions -Percentages - Multiple Regression Analysis
To establish influence of technology on sustainability community water project	Influence of Technology	sustainability of community water project	Technologies available and utilized. -Availability of spare parts -Technical support available	-Level of technologi adoption. -Duration of delivery of spares -level of support provided.	-Interval -Nominal -Ordinal	**Descriptive Statistics** -Frequency distributions -Percentages -Multiple Regression Analysis
To establish influence of financial factors on sustainability of community water project	Influences of Financial factors	sustainability of community water project	-Financial resources availed -O & M costs -water tariffs	-Sources of finances -Regular O & M Reports.	-Interval -Nominal -Ordinal	**Descriptive Statistics** -Frequency distributions -Percentages - Multiple Regression Analysis

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSIONS OF FINDINGS

4.1 Introduction

This chapter contains analysis, presentation, interpretation and discussions of the study findings and the flow is such that subtitles are in the order of the study objectives. Findings of the study are presented in frequency distribution tables followed by interpretation of the tables.

4.2 Questionnaires return rate.

During the study; a total of 195 questionnaires were administered to households out of which 174 were returned, 2 interviews were conducted to government officials, and 3 Focused Group Discussions were held with each group targeting 10 community water management committees. The questionnaire return rate of 89.2 per cent was adequate and the study results were to give the researcher a valid and reliable conclusion and recommendations for the study which can be generalized across the sub county.

4.3 Demographic characteristics of the respondents

The study sought to establish respondents' gender, age, level of education, occupation and monthly income. The data was analyzed and presented using frequency distribution tables.

4.3.1 Respondents distribution by gender

The study targeted both male and female respondents. The response rate broken down by gender was 91 males interviewed which was 52.3 percent of respondents against 83 females, representing 47.7 percent as indicated in Table 4.1.

Table 4.1: Distribution of respondents by gender

Responses	Frequency	Percentages
Male	91	52.3
Female	83	47.7
Total	**174**	**100.0**

Table 4.1 shows that 52.3 percent of the respondents were male while female constituted 47.7 percent of the respondents.

4.3.2 Respondents distribution by age

The study targeted respondents in age groups in four classes and achieved the following response; data sought to establish the distribution of the respondents by age as presented in Table 4.2

Table 4.2: Distribution of Respondents by Age

Responses	Frequency	Percentages
18-25	32	18.4
26-35	60	34.5
36-45	67	38.5
above 45	15	8.6
Total	**174**	**100.0**

Table 4.2 shows that majority of the respondents were between the age of 26-45 years constituting to a cumulative percent of 73 percent of the respondents, 18.4 percent of the respondents were between 18-25 years while 8.6 percent were above 45 years. This shows that water supply issues are a concern of the productive age of the community.

4.3.3 Respondents distribution by Education Level

The study sought to establish the distribution of the respondents by highest Education.

Table 4.3: Respondents Distribution by Highest Education Level

Responses	Frequency	Percentages
No schooling	7	4.0
Primary Incomplete	7	4.0
Primary Complete	51	29.3
Secondary Incomplete	12	6.9
Secondary Complete	72	41.4
Tertiary institution	16	9.2
University	6	3.4
Others	3	1.7
Total	**174**	**100.0**

Table 4.3 shows that majority of the respondents constituting about 41.4 percent had completed secondary education, 29.3 percent of the respondents had completed primary education, 9.2 percent had completed tertiary education, 6.9 percent had not completed secondary education, 4 percent had not completed primary education, 4 percent had not gone to school, 3.4 percent had completed university education while 1.7 percent had undertaken other trainings. This shows that majority of the respondents were literate enough to understand the study questions.

4.3.4 Respondents distribution by Occupation

The study sought to establish the distribution of respondents by occupation

Table 4.4: Distribution of Respondents by Occupation

Responses	Frequency	Percentages
Livestock Keeping	30	17.2
Businessman/woman	111	63.8
Teacher	8	4.6
Civil Servant	4	2.3
others	21	12.1
Total	**174**	**100.0**

Table 4.4 shows that majority of the respondents were businessmen/women constituting to 63 percent, 17.2 percent constitute those involved in livestock keeping, 12.1 percent were involved in other occupations (jua kali), and 4.6 percent of the respondents were teachers while 2.3percent of the respondents were civil servants. This implies that informal employment is the major source of livelihood which is likely to influence the purchasing power of the community and consequently their ability to pay for water bills.

4.3.5 Respondents distribution by monthly income

The study sought to establish distribution of the respondents by monthly income and responses were presented in Table 4.5.

Table 4.5: Distribution of Respondents by Monthly Income

Responses	Frequency	Percentages
Less than 1000	23	13.2
1000-5000	56	32.2
5000-10000	55	31.6
Above 10000	40	23.0
Total	**174**	**100.0**

Table 4.5 shows that 32.2 percent of the respondents had monthly income of between Ksh.1,000-5,000, 31.6 percent of the respondents had a monthly income of Ksh. 5,000-10,000, 23.0 percent of the respondents had monthly income of less than Ksh. 1,000. This shows that majority of the respondents with a cumulative of 77 percent had a monthly income of less than Ksh.10, 000 and hence would affect their ability to pay for water user fee.

4.4 Influence of Community participation on sustainability of community water projects.

The research question (i) sought for the answer on the extent to which the level of community participation influences the sustainability of Community Water Projects in Kitui

West Sub County. To answer this question the researcher solicited the following information from the respondents.

4.4.1. Participation in Existing community water projects.

The respondents were asked to indicate whether they have been involved in existing community water projects.

Table 4.6: Participation in community water projects

	Frequency	**Percentages**
yes	76	43.7
No	98	56.3
Total	**174**	**100.0**

Table 4.6 shows that 43.7 percent of the respondents had been in involved in existing community water projects while majority of the respondents constituting to 56.3 had not been involved in the community water projects in any area. This implies that there is low level of community involvement in community water projects which is likely to influence ownership and sustainability of community water projects.

4.4.2 Area of participation in community water projects by respondents

The researcher further south to establish the areas in which the community is involved in the community water projects and the respondents were asked to indicate the areas in which they were/are involved in community water projects as presented in Table 4.7

Table 4.7: Area of participation in community water projects by respondents

Responses	**Frequency**	**Percentages**
Consultation through meeting	39	22.4
Contributed Materials	23	13.3
Committee/ leader	15	8.6
Not Participated	97	55.7
Total	**174**	**100.0**

Table 4.7 shows that 22.4 percent of the respondents had been involved through consultation in meetings, 13.3 percent had been involved through contribution of materials and 8.6 percent had been involved in the management committees or leadership of the community water projects. 55.7 percent constituted the respondents who had not been involved in the community water projects. This indicates that community involvement in community water project is done mainly done by consulting them through meetings and by asking the community to contribute materials towards the project but community participation should be emphasized throughout the project implementation process in order to enhance sustainability of community water projects.

4.4.3. Interest in future participation in community water projects

Further the researcher sought to establish whether the respondents were interested in participation in community water projects in future as presented in Table 4.8

Table 4.8: Interest in future participation in community water projects

Responses	Frequency	Percentages
Project identification	27	15.5
Project Design and implementation	17	9.8
Contributions towards the project	40	23.0
Management	78	44.8
Others	12	6.9
Total	**174**	**100.0**

As presented in Table 4.8, 44.8 percent of the respondents expressed interest in participating in project management, 15.5 in projects identification, 23 percent in contributing towards the project, 9.8 in project design and implementation and 6.9 percent in other areas (mainly in offering casual labor for the project). This indicates that there is a greater interest in participation in project management of community water projects.

4.4.4 Extent to which community participation enhances project sustainability.

The respondents were asked to indicate the extent to which they thought community participation enhances project sustainability.

Table 4.9: Interest in future participation in community water projects

Responses	Frequency	Percentages
very low extent	11	6.3
Low extent	18	10.3
Moderate Extent	49	28.2
Great extent	60	34.5
Very great Extent	36	20.7
Total	**174**	**100.0**

As presented in Table 4.9, 34.5 percent of the respondents indicated that community participation enhanced sustainability of community water projects to a great extent, 28.2 percent indicated community participation enhanced sustainability to a moderate extent, 20.7 percent indicated that community participation enhanced sustainability to a very great extent, 10.3 per cent indicated community participation only enhance to low extent while 6.3 percent indicated that community participation to a very low extent. This indicates that community participation plays a vital role in sustainability of community water projects and should be emphasized at all levels of community projects implementation.

4.4.5 Benefits of Community Participation in Community Water Project.

The respondents were asked to indicate the benefits that would result from community participation in community water projects as shown in Table 4.10.

Table 4.10: Benefits of Community Participation in Community Water Project

Response	Frequency	Percentages
Strong ownership of projects	34	19.5
Timey maintenance/repairs	68	39.2
Continuity of project	32	18.4
Expansion of project	26	14.9
Better service delivery	13	7.5
Harmony/conflict management	1	.5
Total	**174**	**100.0**

Table 4.10 presents that 39.2 percent of the respondents indicated that community participation would benefit the community water project by timely maintenance and repair of water project, 19.5 percent indicated that community participation would result to strong ownership of the project by the community, 18.4 percent indicated that community participation would result to continuity of the project, 14.9 percent indicated that community participation would result to expansion of the project, 7.5 percent indicated that community participation would result to better service delivery and 0.6 percent indicated community participation would assist in conflict management. This indicates that community participation is critical in ensuring sustainable management of community water projects.

The first objective of the study was to establish how community participation influences sustainability of community water projects in Kitui West Sub County. From the analyzed data 55.7 % of the respondents indicated that they had not been involved in implementation of community water projects yet a cumulative of 91.4 % of the respondents indicated that they were depending on community water projects as their main source of water. In literature review, it was noticed that community participation including the simplest level of involvement enhances the future senses of project ownership and is of key importance for project sustainability (Batchelor et al., 2000). The literature also noted that, community participation in rural water supplies has great potential in contributing towards sustainable water supplies (UNICEF, 2012). The analyzed data also indicated that community

participation was mainly done through community meeting constituting to 22.4 % and through contribution of materials constituting to 13.3%. In literature, it was noted that community participation in the project planning process is a prerequisite for sustainability (UNICEF, 2012), but on going motivation is required for continued participation (Batchelor et al., 2000). In addition the analyzed data indicated that interest of community to participate in future community project with wald level of 1.859 did not significantly influence sustainability of community water projects but was likely to influence the sustainability of community water projects in the sub county. This concurs with the literature as it was noted that community participation does not automatically lead to effective management of community projects (UNICEF, 2012).

4.5 Influence of Technology on Sustainability of Community Water Projects

The research question (ii) sought for the answer on the influence of technology on sustainability of Community Water Projects in Kitui West Sub County. To answer this question the researcher solicited the following information from the respondents.

4.5.1 Types of Water Source

This study sought to establish the type of water source used by the respondents and the responses of the respondents are as presented in Table 4.11.

Table 4.11: Types of Water Sources

Responses	Frequency	Percentages
River	15	8.6
Borehole	96	55.2
Shallow well	7	4.0
Pipeline Extension	56	32.2
Total	**174**	**100.0**

As presented in Table 4.11, majority of the respondents constituting 55.2 percent get water from boreholes, 32.2 percent get water from pipeline extensions, 8.6 percent get water from

rivers while 4.0 percent get water from shallow well. This indicates that boreholes and pipeline extensions were the main sources of water in the study area.

4.5.2 Functional State of Water Sources.

The respondents were asked to indicate whether the sources they were getting water from were functional or not functional and the responses are as presented in Table 4.12.

Table 4.12: Functional state of Water Sources

Responses	Frequency	Percentages
Functional	151	86.7
Not Functional	21	12.1
Do not know	2	1.2
Total	**174**	**100.0**

Table 4.12 shows that 86.7 percent of the respondents indicated that the water sources they were using were functional, 12.1 percent indicated the water sources were not functional and 1.2 percent of the respondents did not know the functional state of the water source. This indicates that at the time of the study, majority of the water sources were functional taking into account that the study was done during the rainy season.

4.5.3 Reasons for Non-functional Water Sources.

The researcher sought further to establish various reasons that cause non- functional water sources as presented in Table 4.13

Table 4.13 Reasons for Non-Functional Water Sources

Responses	Frequency	Percentages
Lack of spares for repair	30	57.7
Lack of funds to buy spare	16	30.8
Lack of trained artisans	3	5.8
Lack of technical support	3	5.7
Total	**52**	**100.0**

As presented in Table 4.13, 122 respondents (70.1 % of total respondents) did not respondent to the question probably because they were not involved in the technical aspects of the water projects. 57.7 percent of those who responded attributed non functionality of water sources to lack of spares for repair, 30.8 percent attributed non functionality to lack of funds to buy spares, 5.8 percent indicated that lack of trained artisans was the reason for non-functionality of water sources and 5.7 percent indicated that lack of technical support was the cause for non-functional water sources. This data implies that it was not clear to most of the respondent the causes of non-functionality in the water sources.

4.5.4 Accessibility of Spare Parts.

The research sought to establish how accessible spare parts for repair of water sources was and the responses are as presented in Table 4.14

Table 4.14: Accessibility of Spare Parts

Responses	Frequency	Percentages
Yes	92	53.5
No	59	34.3
Do not know	21	12.2
Total	**172**	**100.0**

Table 4.14 presents that 53.5 percent of the respondents indicated that spare parts for repair of water sources were accessible, 34.3 percent indicated that spare parts were not accessible and 12.2 percent indicated that they did not know whether they were accessible or not. The Table also shows that only 172 respondents responded to this question.

4.5.5 Affordability of Spare parts.

The study sought to establish affordability of spare parts and the respondents were asked to indicate whether the prices of the spares parts were affordable or not.

Table 4.15: Affordability of Spares

Responses	Frequency	Percentages
Yes	51	29.7
No	51	29.7
Don't Know	70	40.6
Total	**172**	**100.0**

As presented in Table 4.15, 172 respondents out of the 174 respondents responded to this question. 29.7 percent of those who responded indicated that the prices for spare parts are affordable, 29.7 indicated that the prices are not affordable and 40.6 percent indicated that they did not know whether the prices were affordable or not.

4.5.6 Management Committees Technical Capacity

The respondents were asked to indicate whether the management committees possessed the required technical capacity to run the projects and the responses are presented in Table 4.16.

Table 4.16 Management Committees Technical Capacity

Response	Frequency	Percentages
Yes	122	73.9
No	34	20.6
Do not Know	9	5.5
Total	**165**	**100.0**

Table 4.16 presents that 165 respondents responded to the question where 73.9 percent indicated that the management committees had the required technical capacity, 20.6 percent indicated that the management committees did not have the technical capacity and 5.5 percent indicated that they did not know whether the management committees have or do not have the required technical capacity.

4.5.7 Technical Training to Management Committees

The researcher further sought to establish whether the management committees had received any technical training and the responses are presented in Table 4.17.

Table 4.17: Technical Training to Management Committee

Response	Frequency	Percentages
Yes	70	42.4
No	76	46.1
Do not know	19	11.5
Total	**165**	**100.0**

Table 4.17 shows that a total of 165 respondents responded to the questions. 42.4 percent of the respondents indicated that management committees had received technical trainings, 46.1 percent indicated that the management committees had not received technical training and 11.5 percent indicated that they did not know whether the management committees had been trained or not. This indicates that technical training of management of community management committees was lacking in majority of the community water projects.

4.5.8 Trained Artisans in Management Committees to carry out repairs

The study sought to establish whether there were trained artisans in the management committees to carry out repairs to water sources (Boreholes, pipelines and shallow wells) and the responses are as presented in Table 4.18.

Table 4.18 Trained Artisans in Management Committees.

Response	Frequency	Percentages
Yes	68	39.8
No	85	49.7
Do not know	21	10.5
Total	**174**	**100.0**

Table 4.18 presents that 39.8 percent of the respondents indicated that there were trained artisans in management committees, 49.7 percent indicated that there were no trained artisans in management committees and 10.5 percent indicated that they did not know whether there were trained artisans or not. This indicates that majority of the water projects are run without trained artisans who can do minor repairs on breakdowns.

4.5.9 Support Agencies for Repairs.

The study sought to establish the various agencies that support repair of water infrastructures upon breakdown. The responses are presented in Table 4.19

Table 4.19 Support Agencies for Repairs.

Response	Frequency	Percentages
Government	26	14.9
NGO	5	2.9
Private Company	18	10.3
Individual	8	4.6
No Support	117	67.3
Total	**174**	**100**

Table 4.19 presents that 67.3 percent of the respondents indicated that there was no support given for repairs of broken water sources, 14.9 percent indicated that government supported repairs of breakdowns, 10.3 percent indicated that support was received from private companies, 4.6 percent indicated that support was received from individuals and 2.9 percent indicated that support was received from NGOs. This implies that there was little support to the community water projects on repairs of water sources.

The second objective of the study was to assess how technology influences sustainability of community water projects in Kitui West Sub County. From the analyzed data a cumulative of 91.4% indicated that they depend on water sources such as boreholes, shallow wells and pipeline extension while only 8.6% indicated that they depended on rivers as their source of water. The literature noted that rural water supply provision in Sub-Saharan Africa (SSA) is typified by low cost, simple technologies which can be operated, maintained and financed by

poor rural communities or households. The choice of technology for improved water supplies, dependent on environmental, socio-economic and political conditions, includes; protected springs, hand pump equipped boreholes and wells, rainwater harvesting, hand-dug wells, gravity-fed systems and small-scale pumped systems (Harvey and Reed, 2004)

The analyzed data also show that 86.7 % of the respondents indicated that the water sources were functional at the time of the study although 57.7 % of the respondents indicated that the cause of non-functional water sources was due to lack of spare parts and 30.8% indicated that lack of funds to buy spare parts as a reason for non-functional water sources. The literature noted that appropriate technology choice cultivates effective community demand by providing consumers with information about the potential water supply and sanitation solutions that consider local technical capacity and are suitable for local environmental, cultural, and economic conditions (Jenkins and Scott, 2007).In addition, the multivariate regression analysis shows that technical training of management committees with Wald level of 2.117 significantly influences sustainability of community water projects. This concurs with the literature which noted that dynamic operation and management includes establishing supply chains, conducting monitoring and evaluation, and collaborating with internal and external organizations for ongoing technical training and support, as well as hygiene and sanitation advocacy (Harvey and Reed, 2004).

The analysis also show that though affordability of spare parts with Wald level of 1.725 and external support for repairs with wald level of 1.534 did not significantly influence sustainability of water projects, but they were likely to influence sustainability of the water projects in the sub county as it had been noted in the literature that lack of easily accessible replacements for commonly broken well and pump components in rural areas compounds the problem of insufficient financial planning, and results in straight forward repairs requiring weeks or months to complete (Oyo, 2006; UNDP-WSP, 2006).

4.6 Influence of Management skills on sustainability of community water projects

The research question (iii) sought for the answer on the influence of management factors on sustainability of Community Water Projects in Kitui West Sub County. To answer this question the researcher solicited the following information from the respondents.

4.6.1 Types of Management Group Managing Water Project.

The study sought to establish the various types of management groups managing the water sources and the respondents were asked to indicate the management group running the water source they get water from.

Table 4.20: Types of Management Groups Managing Water Projects

Response	Frequency	Percentages
CBO	44	25.3
Private Individual	52	29.9
Religious Group	4	2.3
NGO	2	1.1
WUA	4	2.3
Government Agency	30	17.2
Others (Institutions)	38	21.9
Total	**174**	**99.4**

Table 4.20 presents that 29.9 percent of respondents indicated that the water source was managed by private individual, 25.3 percent indicate that management group in place was CBO, 21.9 percent indicated that water projects were managed by institutions, 17.2 percent indicated that water projects were managed Government Agency, 2.3 percent indicated that water projects are managed by religious groups, 2.3 percent indicated water projects were managed by Water Users Associations and 1.1 percent indicated that water projects were managed NGO.

4.6.2 Role of Management Group.

The study sought to establish the roles of management groups in management of water sources.

Table 4.21: Role of Management Group

Responses	Frequency	Percentages
Collect water use fee	145	83.3
Repair of water supply	21	12.1
Oversee use of water system	8	4.6
Total	**174**	**100.0**

As presented in Table 4.21 83.3 percent of respondents indicated that management group is responsible for water fee collection, 12.1 percent indicated that management group was responsible for repair of water supply and 4.6 percent indicated that management group was responsible in overseeing the use of water system. This indicates that management of community water projects was the responsibility of community management committees.

4.6.3 Training on Management to Management Committees.

The study sought to establish whether management committees had received any training on management of water projects and the responses were presented in Table 4.22

Table 4.22: Training on Management to Management Committees

Responses	Frequency	Percentages
yes	82	47.1
No	92	52.9
Total	**174**	**98.9**

As presented in Table 4.22, 52.9 percent of respondents indicated that community management committees had not received training on management of water schemes while 47.1 percent indicated that the management committees had received training. This implies that adequate managerial skills were lacking in management of the water projects.

4.6.4 Women Representation in Management Committees.

The researcher sought to establish the representation of women in management committees.

Table 4.23: Women Representation in Management Groups

No. of women	Frequency	Percentages
1-2	84	48.3
3-4	42	24.1
5 and above	23	13.2
None	25	14.4
Total	**174**	**100.0**

Table 4.23 presents that 48.3 percent of respondents indicated that there were 1-2 women in management committees, 24.1 percent indicated that there were 3-4 women, 13.2 percent indicated that there were more than 5 women and 14.4 percent indicated that there were no women at all. This indicates that women representation is at a low level in majority of management groups.

4.6.5 Required Actions for Effective Management

The study sought to establish the required actions that can be used for effective management of water projects.

Table 4.24: Required actions for effective management

Responses	Frequency	Percentages
Train committee	154	88.5
Privatize water supply	9	5.2
Water users pay for water	10	5.7
Increases No. of women in management	1	.6
Total	**174**	**100.0**

Table 4.24 presents that 88.5 percent of the respondents indicated that training of committees should be done for effective management, 5.7 percent indicated that water supply should be

privatized, 5.7 percent indicated that water users should pay for water and 0.6 percent indicated that number of women should be increased in management committees for effective management. This implies that training of community management committees is necessary in order to have effective management of water projects.

The third objective of the study was to establish extent to which management skills influences sustainability of community water projects. From the analyzed data 83.3% of the respondents indicated that management group was responsible for repair of water sources. In the literature it was noted that many governments stipulates that rural water services should be community based meaning that the communities select a water supply technology, of which they become owners, are involved in implementation and responsible for managing the operations and maintenance of their chosen technology (UNICEF, 2012). The multivariate regression indicate that the role of management committee with Wald level of 1.001 did not significantly influence sustainability of community water project but was likely to influence sustainability of water projects in the sub county. In additional, 52.9% of the respondents indicated that the community management committees had not received any training. The literature noted that communities are rarely provided with sufficient information and options in order to make informed decisions regarding technology choice and hence their willingness and ability to manage operations and maintenance on long term basis is not firmly established (Harvey,2006).The multivariate regression analysis also indicated that training of management committee with wald level of 2.114 and the managerial capacity of community water management committees with wald level of 3.036 significantly influenced sustainability of water projects in the sub county.

4.7 Influence of Financial Factors on Sustainability of Community Water Projects.

The research question (iv) sought for the answer on the influence of financial factors on sustainability of Community Water Projects in Kitui West Sub County. To answer this question the researcher solicited the following information from the respondents.

4.7.1 Payment for Water services.

The respondents were asked to indicate whether they pay for water services or not. Table 4.25 presents the responses.

Table 4.25: Payment for Water services

Response	Frequency	Percentages
Yes	166	95.4
No	8	4.6
Total	**174**	**100.0**

According to Table 4.25 above, 95.4 percent of the respondents pay for water service and 4.6 percent do not pay for water services. This indicates that majority of the community pay for water services and those who do not pay use water sources that have no maintenance cost such as rivers and therefore no fee is charged. The researcher further sought to establish the frequency of payment for water services and the responses are presented in Table 4.26.

Table 4.26: Frequency of Payment

Responses	Frequency	Percentages
Daily	153	87.9
Weekly	16	9.2
Monthly	5	2.9
Total	**174**	**100.0**

Table 4.26 presents that 87.9 percent of the respondents pay for water services on daily basis, 9.2 percent pay on weekly basis and 2.9 percent pay on Monthly basis. This implies that most people do not have water connections in their homes and fetch water from community water projects on daily basis.

Table 4.27: Rate per 20 litres Jerrican

Responses	Frequency	Percentages
Ksh.1-2	54	31.0
Ksh.3-5	112	64.4
Ksh.6-10	3	1.7
Above Ksh. 10	5	2.9
Total	**174**	**100..0**

Table 4.27 shows that 64.4 percent of the respondents pay 3-5 shillings per 20 litres jerrican, 31.0 percent pay 1-2 shillings, 2.9 percent pay more than 10 shillings for 20 litres jerrican and 1.7 percent pay 6-10 shillings. This implies that water tariffs are very high for the community to afford. The researcher further sought to find out the frequency of how water user fee was collected and the data was presented in Table 4.28.

Table 4.28: Monthly Payment Rates

Responses	Frequency	Percentages
51-100	6	3.5
more than 100	25	14.4
None(Daily Payment)	143	82.2
Total	**174**	**100.0**

Table 4.28 presents that 14.4 percent of the respondents pay monthly water fee of more than Ksh 100, 3.5 percent pay a monthly water fee ranging between 51-100 shillings and 83.2 of the respondents pay for water on daily basis.

4.7.2 Management of Money generated from Sale of Water.

The study sought to find out how water user fee is collected and used by management committees as presented in Table 4.29 and Table 4.30.

Table 4.29: Water User Fee collector

Responses	Frequency	Percentages
Management Group	32	18.4
Individuals	31	17.8
Caretaker	92	52.9
Government	7	4.0
Religious group	1	.6
Others (Institutions)	11	6.3
Total	**174**	**100.0**

Table 4.29 presents that 52.9 percent of respondents indicated that water user fee is collected by caretakers, 18.4 percent indicated that collection is done by management group, 17.8 percent indicated that collection is done by individuals, 6.3 percent indicated that collection is done by institutions and 0.6 percent indicated that collection is done by religious group.
Table 4.30 present data on how the collected water user fee is managed by the community water management committees.

Table 4.30: Management of Water User Fee

Responses	Frequency	Percentages
Banked	142	81.6
Keep at home by management group	10	5.7
Kept by individuals	12	6.9
Others (Institutions)	10	5.8
Total	**174**	**100.0**

Table 4.30 presents that 81.6 of the respondents indicated that money collected as water user fee is banked, 6.9 percent indicated that the money is kept by individuals, 5.7 indicated that the money is kept at home by management group and 58 percent indicated that the money is kept by institutions. This indicates proper management of water user fee was lacking thereby affecting the financial capacity of community water projects.

4.7.3 Financial Capacity to pay for spare parts, operations and maintenance services.

The researcher sought to establish whether the community management committees had the capacity to purchase spare parts and pay for operations and maintenance services as presented in Table 4.31.

Table 4.31: Financial Capacity to Purchases Spares Parts

Responses	Frequency	Percentages
Yes	143	82.2
No	22	12.6
Don't know	9	5.2
Total	**174**	**100.0**

Table 4.31 presents that 82.2 percent of the respondents indicated that the management committees have the financial capacity to purchase spare parts for the water sources upon breakdowns, 12.6 percent indicated that the management committees do not have that financial capacity while 5.2 percent indicated that they did not know whether they have the financial capacity or not.

Table 4.32 presents data on the financial capacity of the community management committees to pay for operations and maintenance services.

Table 4.32 : Financial Capacity to Pay for Operations and Maintenance Services

Responses	Frequency	Percentages
Yes	158	90.8
No	16	9.2
Total	**174**	**100.0**

Table 4.32 presents that 90.8 percent of respondents indicated that the management committees have the financial capacity to pay for maintenance and operations services for water sources while 9.2 percent indicated that the management committees do not have the financial capacity.

Table 4.33 present data on support agencies for operations and maintenance services for water schemes.

Table 4.33: Support Agency for Payment of Operations and Maintenance Services

Response	Frequency	Percentages
Government	10	5.7
NGO	2	1.1
Individuals	2	1.1
Others (Institutions)	1	.6
No Support	159	91.5
Total	**174**	**100.0**

As presented in Table 4.33, 91.5 percent of the respondents indicated that there was no support to payment of operations and maintenance of water sources, 5.7 percent indicated that there was support from the government, 1.1 percent indicated that support was received from NGO, 1.1 percent indicated support was received from individuals and 0.6 percent indicated that support was received from institutions. This implies that there was little support given to community water projects for operations and maintenance of water sources.

The fourth objective of the study was to establish how financial factors influence sustainability of community water projects. From the analyzed data, 95.4% of the respondents indicated that they paid for water services and 64.4% of the respondents indicated that they paid between Ksh. 3-5 per 20 litres jerrican which was relatively high considering that a cumulative of 77% of the respondents indicated that their monthly income was below Ksh. 10,000. In the literature it was noted that community financing mechanisms to ensure sustainable payment of tariffs must be matched to specific communities and their economic characteristics, and innovative strategies are needed to ensure that the rural poor are adequately served (Harvey, 2006). In addition, the analysis indicated that 91.5% of the respondents indicated there is no support for payment of operation and maintenance services. The multivariate analysis also indicated that financial support for payment of operation and maintenance services with wald level of 3.317 significantly influenced sustainability of community water projects in the sub county. In the literature it was noted that there is need

for international donors and national governments to develop long term financing mechanism for which realistic, targeted and transparent approach to subsidy is required (Harvey, 2006). The literature also noted that if rural water are to be sustainable three categories of costs must be calculated and calculated; direct operations and maintenance costs, rehabilitation and expansion costs Harvey and Reed, 2004).

4.8 Multivariate Analysis

This section presents multivariate analysis of data in order to determine variables that were significant or not significant and which influence or do not influence sustainability of community water projects in Kitui West Sub County using Wald Test through Logic regression Analysis as presented in Table 4.34

Table 4.34: Results of Multivariate Analysis

Variables	B	Wald	Exp (B)	Significant
Area of Participation	-.266	.321	.766	+
Interest of community to participate in future projects	-.424	1.859	.654	+
Participation benefits	-.312	.510	.732	+
Role of Management group	.621	1.001	1.861	+
Training of Management committees	-1.325	2.144	.266	++
Managerial capacity of management committees	-2.070	3.036	.126	++
Water source	-2.434	.890	.088	+
Functionality of Source	34.133	.000	6.665	+
Reasons for non-functionality	-1.707	.347	.181	+
Technical training to management committees	-2.722	2.177	.066	++
Spare parts accessibility	-1.326	.639	.265	+
Affordability of Spare	-3.542	1.725	.029	+
Availability of trained artisans	4.675	.840	1.072	+
External Support for Technical repairs	-3.029	1.534	.048	+

Payment for water services	-21.673	.000	.000	+
Payment rate	.198	.412	1.219	+
Purchase of Spare parts	.323	.487	1.382	+
Payment for operations and Maintenance Services.	.532	.424	1.703	+
Financial support for payment of Operation and Maintenance services.	-1.291	3.317	.275	++

+ Variables not significantly influencing sustainability of community water projects at 95% significant level.

++ Variable significantly influencing sustainability of community water projects at 95% significant level

An independent variable with wald level of 2 and above was significant and hence influenced sustainability of community water projects in Kitui West Sub County. An independent variable with wald level between 1 and 2 were not significant but were likely to influence sustainability of community water projects in Kitui West sub County while an independent variable with wald level of less than 1 was not significant and was not likely to influence sustainability of community water projects in Kitui West Sub County.

From the analysis, managerial training of management committees, managerial capacity of management committees, technical training of management committees and financial support for payments of operations and maintenance services were found to be significant and therefore influenced sustainability of community water projects in Kitui West Sub County.

Although, Interest of community to participate in future projects, role of management committees, affordability of spare parts and support for technical repairs were not found significant, they were likely to influence the sustainability of community water projects in the Sub County.

CHAPTER FIVE
SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents summary of findings, conclusions and recommendations of the study .It summarizes the results which were obtained from the analysis of the questionnaires. The section also presents suggestions for further studies. The aim of the study was to establish the factors that influence sustainability of community water projects in Kitui West Sub County.

5.2 Summary of Findings

The purpose of this study was to establish the factors influencing sustainability of community water projects in Kitui West Sub County, Kitui County. The study was guided by the following four objectives. The first objective of the study was to establish how community participation influence sustainability of community water projects. The study established that 56.3% of the community had not been involved in the implantation and management of community water projects and 39% of those who had been involved participated through meetings and contribution of materials for projects and only 15% were involved in management of the projects. Results from the multiple regression analysis established that interest of community to participate in future projects with wald level of 1.859, area of community participation with wad level of 0.321 and participation benefits with wald level of 0.510 did not significantly influence sustainability of community water projects in the Sub County, however, these variables were likely to influence the sustainability of community water projects.

The second objective of the study was to assess the influence of technology on sustainability of community water projects. The study established that 55.2% of the community depended on borehoes and 32.2% on pipeline extensions as their major sources of water. The study also established that lack of spare parts (57.7%) was a major cause of non-functional water sources in the study area. The results from the multiple regression analysis established that lack of Technical training of management committees with wald level of 2.117 significantly influenced sustainability of water projects while accessibility of Spare parts with wald level

of 0.639, affordability of spare parts with Wald level of 1.725 and external support for technical repairs with wald level of 1.534 did not significantly influence sustainability of community water projects in the Sub County.

The third objective of this study was to establish extent to which management skills influence sustainability of community water projects. The study established that management of community water project was the responsibility of community management committees, however, 52.9% of the respondent indicated that the management committees had not received any training which was also validated from data collected during the Focused Group Discussions. The study also established that training of community water management committee would greatly improve the effectiveness of management of the projects contributing to more sustainable projects. The results of the multiple regression analysis also indicated that training of management committees with wald level of 2.144 and managerial capacity of management committees with wald level of 3.036 significantly influenced sustainability of community water projects. However, the role of management group with wald level of 1.001 did not significantly influence sustainability of community water projects but was likely to influence sustainability of the projects in the Sub County.

The fourth objective of the study was to establish how financial factors influence sustainability of community water projects. The study established that 87.9% of the respondents paid for water at a cost of Ksh.3-5 per 20 liter jerrican which was relatively high compared to their monthly income which was below 10, 000 for 77% of the respondents. The study also established that there was minimal financial support for operations and maintenance of water service as indicated by 91.5% of the respondents. The results from multiple regression analysis also indicated that lack of financial support for payment of operations and maintenance services with wald level of 3.317 significantly influenced sustainability of community water projects. However, payment rates for water with wald level of 00.412 and prices of spare parts with wald Level of 0.487 did not influence sustainability of community water projects in the Sub County

5.3 Conclusions of the study.

The study found that sustainability of community water projects in Kitui West Sub County was being influenced though differently by community participation, technology, management and financial factors. Managerial training of management committees, managerial capacity of management committees, technical training of management committees and financial support for payments of operations and maintenance services significantly influenced sustainability of community water projects in Kitui West Sub County.

The study concluded that sustainability of community water projects could be achieved through enhancing the level of community participation, developing programmes that will address training needs of the community water management committees in terms of technical and managerial aspects, and developing sustainable financing strategies for operations and maintenance of community water projects.

5.4 Recommendations of the study.

The study makes the following recommendations;

1. The policy makers should formulate policies aimed at addressing capacity building of management committees in terms of managerial and technical aspects as the study shows that lack of managerial capacity of the management committees (wald level of 3.036) significantly influenced sustainability of community water projects
2. Policy makers should also formulate policies to address sustainable financing of operations and maintenance of community water projects as the study show that 91.5% of the respondents indicated that there was no financial support for operations and maintenance.
3. The private partners who provide technical support and spare parts should be more aggressive and charge affordable prices for their services and products. More players in the sector should be encouraged to invest in the sector to make the spare parts easily accessible to the water management committees and other individual users.

4. The programmes/projects should target technical and managerial training of management committees who from the study, 52.9% of the respondents indicated have not received any training.

5.5 Suggestions for further Research.

The researcher is suggesting further studies to be carried out on sustainable technological improvements that would lead to sustainable management of community water projects. Further study on the role of external support for community water projects in ASAL is recommended to chat a way for a reliable and sustainable financing mechanism for community water projects.

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APPENDICES

Appendix I: Letter of Transmittal

MUNYUI EIZABETH WAIRIMU

P.O BOX 16,

KITUI

Dear Sir/Madam,

RE: Transmittal Letter

I am a post graduate student from the University of Nairobi pursuing a Master of Arts Degree in Project Planning and Management. As part of the requirements for the award of the degree, I am carrying out a study on the "**Factors Influencing Sustainability of Community Water Projects in Kitui West Sub County"**.

This study is for academic purposes but will be useful for the government, NGOs and other private and corporate institution involved in development projects.

Your participation in the exercise is voluntary and you are free to seek clarification where you do not understand.

The information provided will be treated with utmost confidentiality and will be used for academic purposes only. The privacy of the respondent will be maintained.

I am therefore kindly requesting you to participate in the study by providing answers to questions asked to you.

Thank you in advance.

Yours faithfully

Elizabeth Munyui

Appendix 2: Questionnaire

This questionnaire is designed to collect data on factors influencing sustainability of community managed water supply in Kitui West sub-County. You have been selected to assist in the data collection exercise. The information you provide will be treated with utmost confidentially. Answer the questions provided by ticking (√) the correct choice or by providing the relevant information.

Section A: Demographics

1. Gender of the respondent a).Male ( ) b). Female( )
2. What is your age in years?
    a) 18-25 ( )
    b) 26-35 ( )
    c) 36-45 ( )
    d) Above 45 ( )
3. Number of Household members Male……. Female……..
4. What is your highest level of education?
    a) No schooling ( )
    b) Primary incomplete ( )
    c) completed primary ( )
    d) Secondary incomplete ( )
    e) secondary completed ( )
    f) Tertiary institution ( )
    g) University level ( )
5. What is you occupation?
    a) Livestock keeping ( )
    b) Businessman/woman ( )
    c) Teacher ( )
    d) Civil servant ( )
    e) Others ( )
6. What is your monthly income?
    a) Less than Ksh1000 ( )
    b) Between 1000-5000 ( )
    c) 5000-10000 ( )
    d) Above10000 ( )

Section B: Community Participation

7). Have you ever participated in the initiation/start of the water projects in this area? Yes/ No

If yes, what was your area of participation?

a. I was consulted through a meeting
b. I contributed materials
c. As a leaders/part of the committee
d. Others – specify…….

8). If No in 7 above, what areas would you wish to be involved in in water projects?

a. Project prioritization and identification
b. Project design and implementation
c. Contributions of funds/other resources towards the project
d. management/running of the operation of the rural community based water projects
e.Others……
…….

9). In your opinion, to what extent does the community participation positively enhance the sustainability of rural community water projects?

a. To a very low extent [ ]
b. To a low extent [ ]
c. To a moderate extent [ ]
d. To a great extent [ ]
e. To a very great extent [ ]

10) Name at least two main benefit associated with Community participation in water project?

a. Strong ownership of the projects [ ]
b. Timely maintenance/repairs [ ]
c. Continuity of the project [ ]
d. Expansion of the project [ ]
e. Better service delivery [ ]
f. Harmony/conflict management [ ]
g. Others (specify) ……

Section C: Management Factors

11. What type of community management group is managing the water supply?

a) CBO [ ]
b) Private individual [ ]
c) Religious group [ ]
d) NGO [ ]

e) WUA [ ]
f) Government agency [ ]
g) Others [ ]

12. What is the role of the management structure in place?

a) Collect water use fee [ ]
b) Repair water supply when broken down [ ]
c) Oversee the use of the water system [ ]
d) Others (Specify) [ ]

13. Have the management group received any training on the management issues?

a) Yes [ ]
b) No [ ]

14. Do you think the groups have adequate capacity to manage water supply system?

a) Yes [ ]
b) No [ ]

15. If no why

……
……
…….

16. What needs to be done to ensure that the water supply system is managed effectively?

a) Train the committee [ ]
b) Privatize the water supply system [ ]
c) Make the water users pay for the water collected [ ]
d) Keep the money save in a bank account [ ]

17. Does the community management group receive any support from the external support?

a) Yes [ ]
b) No [ ]
c) Don't know [ ]

18. If yes in 17 above, which agency support the community and how?

a) Government [ ]
b) NGO [ ]
c) Religions group [ ]
d) Private company [ ]
e) Individual [ ]
f) Others Specify [ ]

19. How many women are in the management committee?

a) 1-2 [ ]
b) 3-4 [ ]
c) 5 and above [ ]
d) None [ ]

20. Do you think representation of more women in the water committee can make the water supply system sustainable?

a) Yes [ ]
b) No [ ]

21. Explain you answer above

……
……
……
……

Section D: Technical Factors

22. Which is the main water source for your household?

a) River [ ]
b) Borehole [ ]
c) Shallow well [ ]
d) Pipeline extension [ ]
e) Water pan [ ]
f) Others [ ]

23. Is the water source functional?

a) Yes [ ]
b) No [ ]
c) Don't know [ ]

24. If No in 23 above why do you think the water source is not functional?

a) No spare Parts for repair [ ]
b) No funds to do buy spares [ ]
c) No trained artisans [ ]
d) No technical support available to conduct the repairs [ ]
e) The community management group is not willing to repair the system [ ]

25. Does the management committee have the required technical capacity for the operation and maintenance (O&M) of the water supply scheme?

a) Yes [ ]
b) No [ ]

c) Don't know [ ]

26. Have the management group been trained on Operation and maintenance of the water supply system

a) Yes [ ]
b) No [ ]
c) Don't know [ ]

27. Does the management committee have the access to spare parts?

a) Yes [ ]
b) No [ ]
c) don't know [ ]

28. Are the spare parts at affordable price?

a) Yes [ ]
b) No [ ]
c) don't know [ ]

29. Are there any trained artisans in management committee?

a) Yes [ ]
b) No [ ]
c) Don't know [ ]

30. Do they carry out repairs when the water supply is broken?

a) Yes [ ]
b) No [ ]
c) don't know [ ]

31. If No in No. 30 who support in the repairs?

a) Government [ ]
b) NGO [ ]
c) Religions group [ ]
d) Private company [ ]
e) Individual [ ]
f) Others (Specify) [ ]

Section E: Financial Factor

32. Do you pay for the water services?

a) Yes [ ]
b) No [ ]

33. If yes in No. 32, how is the payment made?
    a) Daily [ ]
    b) weekly [ ]
    c) Monthly [ ]
    d) Others [ ]
34. How much money do you pay for 20 litres container?

    a) Ksh.1-2 [ ]
    b) Ksh.3-5 [ ]
    c) Ksh.6-10 [ ]
    d) Ksh.10 and more [ ]
35. If on monthly/weekly basis how much do you pay?

    a) Ksh.10-20 [ ]
    b) Ksh.20-50 [ ]
    c) Ksh.51-100 [ ]
    d) More Ksh.100 [ ]
36. If no in question 32` what are the reasons for not paying for the water service

    a) Water is free [ ]
    b) Very poor quality to pay for [ ]
    c) Can't afford to pay [ ]
    d) other reasons (specify) [ ]
37. Who collects the money?

    a) The management group [ ]
    b) Individuals [ ]
    c) Caretaker [ ]
    d) Governments [ ]
    e) Religious groups [ ]
    f) Others (specify) [ ]
38. How is the money collected managed?

    a) Banked [ ]
    b) Kept by the management group at home [ ]
    c) Kept by the individuals [ ]
    d) Sub-divided among the community members [ ]
    e) Others (specify) [ ]
39. Does the group have the capacity to buy the spare parts?

    a) Yes [ ]
    b) No [ ]
    c) don't know [ ]

40. Is the group responsible for the payment of operation and maintenance of the water supply system?

    a) Yes [ ]
    b) No [ ]
    c) don't know [ ]

41. If no who pays for the operational maintenance of the water supply system?

    a) Governments [ ]
    b) NGO [ ]
    c) Religious group [ ]
    d) Individuals [ ]
    e) Others specify [ ]

Thank you very much.

Appendix 3: Focus Group Discussion Guide.

This guide has been developed to collect data on factors influencing sustainability of community water projects in Focused Group Discussions with Water Management Committees.

1. How do you participate in project identification and implementation?
2. Do you think the level of involvement is adequate?
3. What contribution do you make towards financing water projects?
4. What management structures are commonly used in managing of Rural Water Supply scheme in Kitui West Sub-County?
5. What is the capacity of the management structure in place? Are they able to effectively and efficiently manage, operate and maintain the system?
6. Does the management structure in place understand their roles and responsibilities in the rural water management?
7. What support does the community Management receives from the government or other institutions?
8. Does the management structure in place have adequate capacity to manage the water supplies?
9. How is gender issues mainstreamed in the management structure?
10. What are the management factors affecting the sustainability of community managed Rural Water Supply scheme in Kitui West Sub-County
11. What technical factors affect the sustainability of the water supply in Kitui West sub-county?
12. What financial factors affecting the sustainability of the community managed water supplies?
13. How much does the community pay for the water?
14. What are the sustainability rates for water supplies in Kitui West Sub-County?
15. How is the finances collected utilized?
16. Who pays for the operation and maintenance?
17. Who provides the technical support required to effectively repair major repairs?
18. Does the management committee collect water user fees from the sales of the water?
19. How is the financial managed by the water management committee?
20. Are the spare parts available locally and at an affordable price?
21. Have the operators been trained?

Appendix 4: Interview Guide

This guide has been developed to collect data from government officials on factors influencing sustainability of community water projects in Kitui West Sub County.

1. What are the sustainability rates of the water supplies in Kitui West sub–Count
2. What management structures are commonly used in management of Rural Water supply scheme in Kitui West sub- County?
3. Does the management structure in place having adequate capacity to manage the water supplies?
4. How is gender issues mainstreamed in the management structure?
5. What are the institutional factors affecting the sustainability of community managed Rural Water Supply scheme in Kitui West Sub-County
6. What technical factors affect the sustainability of the water supply in Kitui West sub-county?
7. What financial factors affecting the sustainability of the community managed water supplies?
8. What is the capacity of the management structure in place? Are they able to effectively and efficiently manage, operate and maintained the system?
9. Does the management structure in place understand their roles and responsibilities in the rural water management?
10. What support does the community Management receive from the government or other institution?
11. Who provides the technical support required to effectively repair major repairs?
12. Does the management committee collect water user fees from the sales of the water?
13. How is the finances collected utilized?
14. How is the finances managed by the water management committee?
15. Are the spare parts available locally and at affordable price?
16. Have the caretakers and artisan s been trained?
17. What policies support rural water supplies?
18. How do you participate in project identification and implementation?
19. What contribution do you make towards financing water projects?

Appendix 5: List of Community Water projects studied.

S/No.	NAME OF PROJECT	WARD	POPULATION SERVED
1.	Kwa Ndonga Earth Dam	Matinyani	1200 People and 1400 Livestock
2.	Kyambusya Earth Dam	Matinyani	1200 People and 1300 Livestock
3.	Kwa Nzuki Earth Dam	Matinyani	1100 People and 1400 Livestock
4.	Matinyani Earth Dam	Matinyani	900 People and 1000 Livestock
5.	Kunikila Borehole	Matinyani	2900 people and 1700 livestock
6.	Kyaani Borehole	Matinyani	2000 people and 1500 livestock
7.	Kithumula Borehole	Matinyani	2000 people and 1200 livestock
8.	Mithikwani Borehole	Matinyani	2700 people and 1300 livestock
9.	Maseki Borehole	Matinyani	3500 People and 2000 livestock
10.	Kavoko	Matinyani	99 people
11.	Muthuyu	Matinyani	88 people
12.	Kyaani Earth Dam	Kwa Mutonga	1700 people and 1400 livestock
13.	Syokithumbi Earth Dam	Kwa Mutonga	1700 people and 1300 livestock
14.	Syokimau Earth Dam	Kwa Mutonga	2000 people and 2000 livestock
15.	Kwa Mulungu Earth Dam	Kwa Mutonga	1700 people and 1300 livestock
16.	Katheka Kwa Vonza	Kwa Mutonga	2000 people
17.	Miwongoni Kwa Mboya	Kwa Mutonga	2500 people
18.	Kathivo Kwa Mulungu	Mutonguni	2000 people
19.	Kakumuti Borehole 1	Mutonguni	2000 People and 1300 livestock
20.	Kakumuti Borehole 2	Mutonguni	1500 people and 1700 livestock
21.	Musengo Borehole	Mutonguni	2300 people and 1500 livestock
22.	Kaimu Borehole	Mutonguni	3000 People and 2500 livestock
23.	Kiamani Borehole	Mutonguni	3100 People and 1400 livestock
24.	Kasakini Borehole	Kauwi	3500 People
25.	Katutu Sec Borehole	Kauwi	300 People
26.	Emivia Borehole	Kauwi	3200 People
27.	Kabati Borehole	Kauwi	1800 People
28.	Kyondoni Sec Borehole	Kauwi	2100 People
29.	Sangala Borehole	Kauwi	1800 People
30.	Kyeng'e Borehole	Kauwi	2100 People