CAPITAL STRUCTURE, MANAGEMENT AND SUSTAINABILITY OF COMMUNITY WATER PROJECTS IN KIENI CONSTITUENCY, NYERI COUNTY, KENYA

SOLOMON MURIUNGI MBURUNG'A

Research Thesis Submitted in Partial Fulfillment for the Requirements of the Award of Doctor of Philosophy in Project Planning and Management of University of Nairobi

2016

DECLARATION

This research thesis is my original work and has not been presented for the award of any degree or any other award in this university or any other university or institution of higher learning.

_____ _____

Solomon M. Mburung'a **Date**

Reg. No.: L83/80901/2011

This research thesis has been submitted with our approval as University supervisors.

_____ _____

Dr. Lillian Otieno Omutoko **Date**

Senior Lecturer, Department of Extra –Mural Studies,

University of Nairobi.

_____ _____

Prof. Pokhariyal Ganesh **Date**

School of Mathematics

University of Nairobi

_____ _____

Dr. Anne Wairimu Ndiritu **Date**

Senior Lecturer, Department of Distance Education,

University of Nairobi.

ACKNOWLEDGEMENT

This research would not have been possible from the beginning without the enthusiasm and motivation from Dr. Lillian Otieno, Professor Pokhariyal Ganesh and Dr. Anne Wairimu Ndiritu. Their input in developing the initial concepts of this research thesis; for their unreserved support, constructive scholarly comments; and assistance helped a great deal to finish this thesis. I say thank you so much. I would like to thank University of Nairobi and specifically the Extra-Mural Department for making possible for me to undertake this study. My appreciation also goes to the University of Nairobi library staff whose assistance helped me in providing necessary information in order to accomplish the research thesis.

I would like to thank my wife Millicent not only for her support in this study, but also for all what she has done for me throughout my life. My kind thanks goes to my colleagues for the moral support and in any other way to complete this thesis. Your encouragement and criticisms have made positive contribution to this thesis.

I am greatly honored to thank and to express my gratitude to the District Water Officer in Kieni East and Mr. James Mwangi of IFAD Nyeri for their cooperation and information given which was very helpful and insightful and all others who assisted me with their unreserved support, kindness, consistent and assistance from the beginning of this research thesis. Without their guidance and assistance, this research thesis would not have been possible.

DEDICATION

This research thesis is dedicated to my dear wife Millicent, son Austin and daughter Cherise.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

ANOVA	Analysis of Variance
CDF	Constituency Development Fund
CWPs	Community Water Projects
DDA	Demand Driven Approach
DWO	District Water Officer
IFAD	International Fund for Agricultural Development
JMT	Joint Monitoring Program
KFSSG	Kenya Food Security Steering Group
KMO	Kaiser-Meyer-Olkin
MDGs	Millennium Development Goals
MFIs	Micro-finance Institutions
MWI	Ministry of Water and Irrigation
NGO	Non-Governmental Organisation
NSE	Nairobi Securities Exchange
O & M	Operations and Maintenance
PRSPs	Poverty Reduction Strategy Papers
RWSN	Rural Water Supply Network
SDA	Supply driven Approach
SPA	Service Provision Agreements
SPSS	Statistical Package for Social Sciences
UN	United Nations Children's Emergency Fund
UNICEF	United Nations
VIF	Variance Inflation Factor
WASP	Water Services Providers
WASREB	Water and Sanitation Regulatory Board
WHO	World Health Organization
WSB	Water Services Board
WSP	Water Services Provider
WSTF	Water Services Trust Fund
WUAs	Water User Association

ABSTRACT

The purpose of this study was to investigate the influence of capital structure on sustainability of community water projects in Kieni Constituency, Nyeri County, Kenya. The objectives of the study were to investigate influence of equity financing, debt financing, grant financing, water user fee and capital structure on sustainability of community water projects. The last objective was to assess the mediating influence of management on the relationship between capital structure and sustainability of community water projects. This study was limited to community water projects in Kieni. The study was grounded on the model of sustainability and theories of capital structure namely: the prospect theory, pecking order theory and trade-off theory. The study adopted a descriptive survey design and conducted a census of all the 73 water projects in Kieni Constituency. Respondents were chairpersons of each of the water projects, 382 beneficiaries of the water projects, two district water officers and nine local bank managers. Data collection instruments were questionnaires, interview schedules and observation schedules. Tests for statistical assumptions were done then followed by descriptive statistical analysis, which included, calculation of means, standard deviations, frequency and percentages followed by brief explanation, as well as inferential statistics, that is, multiple regression analysis for modeling; Pearson's Product Moment Correlation was used to ascertaining strength and direction of the association between variables; and ANOVA for testing hypothesis. On objective one, it was established that, there was a moderately weak positive relationship between equity financing and level of sustainability of community water projects. Hypothesis one was not accepted and therefore, it was concluded that, there was significant relationship between equity financing and sustainability of community water projects. Equity financing accounted for 8.8% of the variation in levels of sustainability. On the second objective of the study, it was established that, there was a weak negative relationship between grant financing and level of sustainability of community water projects. An increase in grants reduces the levels of sustainability of a community water project. The null hypothesis two was accepted. It was therefore concluded that, there was no significant relationship between grant financing and sustainability of community water projects. Grant financing accounted for only 2.3% of the variation in levels of sustainability. The results of analysis of objective three, the study established that, all the projects did not obtain any loan from any bank nor utilized any other form of debt finance, therefore missing a financing option in terms of debt financing. On objective four, the study found out that, community members pay water user fee to respective water project for catering for operations and maintenance of the project except for dams and water pans whose water was free. In addition, there was a significant moderate positive relationship between water user fee and sustainability of community water projects. The null hypothesis four was rejected. The study therefore concluded that, there was significant relationship between water user fee and sustainability of community water projects. The Water user fee accounted for 31.2% of the variation in levels of sustainability. Objective five sought to establish the influence of capital structure on sustainability of community water projects. The study established that, there was no significant relationship between capital structure and sustainability of community water projects. Capital structure accounted for 11% of the variation in levels of sustainability. This meant that 89% of the variation in levels of sustainability could not be explained by variation in capital structure. On objective six, the study established that, there was significant mediating effect of management on the relationship between capital structure and sustainability of the community water projects. The study recommended that, communities participate in managing community water project finances. Community water projects should also utilize debt financing to boost their capital base. Other scholars should investigate further, the influence of capital structure on non-profit organization in other sectors.

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Water is the backbone of prosperity and growth and also indispensable for life. Lack of safe drinking water or water scarcity is one of the world's leading global problem that affect more than 2 billion people. This translates to one in every six people lacking access to adequate drinking water (World Bank, 2011). According to WHO and UNICEF (2006), 80% of the population not accessing drinking water is found in three regions, that is, Eastern Asia, Southern Asia and sub-Saharan Africa. Water accessibility is above 78% in all regions except sub-Saharan Africa. In sub Saharan Africa water accessibility stands at 50%. WHO and UNICEF (2013) estimated that, 300 million people lack safe drinking water, in Africa. In addition, Yahaya (2004) posit that, out of 55 countries in the world whose domestic water use is below 50 litres per capita per day, 35 are in Africa. In sub-Saharan Africa, the number of urban dwellers not accessing safe drinking water and basic sanitation doubled from 1990 to 2004. In rural areas, in 2004, the number of people with no access to improved drinking water was five times higher than the number of urban people (WHO & UNICEF, 2006). According to WHO and UNICEF (2013), in Kenya, 59%, that is, 83% in urban areas and 52% in rural areas, had access to safe water sources meaning 41% do not have access to drinking water.

Globally, efforts had been put to meet the previous Millennium Development Goal 7c which aimed at reducing by half the proportion of people without sustainable access to safe drinking water and sanitation by 2015 (UN, 1992). However the goal was not achieved fully. In 2012, UN Conference resolved to set new global Sustainable Development Goals (SDGs), to guide development in the world after 2015. According to Osborn, Cutter and Ullah (2015), goal number six of the SDGs was to ensure availability and sustainable management of water and sanitation for all by the year 2030. Under goal 6.1, the target is to achieve universal and equitable access to safe and affordable drinking water for all. Scanlon, Cassar, and Nemes (2004), noted that, many non-governmental organizations and national governments have spent large

amount of resources in initiating water projects especially in rural areas which are managed by communities.

1.1.1 Sustainability of Water Projects

Sustainability in projects means, the process of ensuring a project systems and interventions continue to operate and function well and be able to generate benefits over time as designed (Kimberly, 1998). Sustainability, therefore, is the ability of a water project to operate and maintain initial project service standards over time. After the signing of UN Agenda 21 in 1992, the countries committed themselves to sustainability of interventions and developmental efforts, especially on drinking water projects (Sutton, 2004). The high number of non-functioning water systems and systems functioning below expectations was an indicator of problems in sustainable operations and maintenance of water systems. According to Sutton (2004) survey of 11 countries in Africa, only 35-80 percent of the water systems in rural areas were functioning. A study on South African boreholes documented that, 70 percent of all the boreholes were not functional. In Tanzania, only 10 percent of water supply systems that were initiated 25 years or older were still functioning and only 45 percent of the total number were in operation and functioning (Haysom, 2006).

One of the top ten of countries with the high population without access to drinking water was Kenya. Others include Rwanda, Tanzania, Ethiopia, Niger, Uganda, Gabon, Central Republic of Africa, Cameroon, Ghana among others. In Kenya, access stood at 51 percent nationally (UNICEF & WHO, 2012). Large investments were made to supply water to Kenyan rural people who lack access to drinking water. Recent studies show large percentage of the new water supplies projects cease to function few years after construction (Ministry of Water and Irrigation, 2007; and Rural Water Supply Networks, 2007). Causes for this low 'post-construction' failure were technical, institutional, financial, social or environmental. None of these studies investigated capital structure as a factor that influenced the level of sustainability. All these factors identified depend upon amount of funds available in order to ensure sustainability.

1.1.2 Kenya's Rural Water Institutional Arrangement

The National Water Master Plan of 1974 indicated the Government of Kenya's efforts in the management of the water sector in Kenya. The primary target was to ensure availability of water, at reasonable distance, to all Kenyans by the year 2000 (Institute of Economic Affairs, 2007). The "water for all by the year 2000" programme was to be achieved through the initiation and implementation of water supply projects required. The government was to directly fund the water services projects to Kenyans, as well as make policy regarding water, regulate the use and exploitation of water resources and water towers (Mumma, 2005). Unfortunately, in the 1980's the Government experienced financial constraints and it could not deliver water for all to Kenyans by the year 2000 as envisioned. Focus therefore turned to exploring ways of involving communities, donors and private sector in supplementing the Government in the provision of water ((Institute of Economic Affairs, 2007 and Mumma, 2005).

In 1983, the Government of Kenya unveiled the development policy and philosophy of District Focus for Rural Development. This policy transferred the responsibility of development to districts in order to spur local initiatives in development process and improve local capabilities. This policy, combined with the philosophy of "*harambee"*-spirit of working together which was coined after independence of Kenya, gave the framework for community involvement and participation in water supply projects (Roy, 2005). However water coverage levels according to the Department of Water were estimated at 45 percent only (MWI, 2007). According to Kenya National Bureau of Statistics (2010), more than one third of Kenyan households get their drinking water from non-improved sources, which include surface water from the lakes, rivers and streams. In rural areas, 46 per cent access their water from the non-improved water sources. This was despite billions of shillings being used in construction of water projects in the country every year. For example, Ksh. 34.4 billion was spent on water projects and sector in 2012/13 financial year (Republic of Kenya, 2014).

The problem of water in rural areas was further illustrated by Kenya Food Security Steering Group (KFSSG) (2012) in short rains assessment report, which found out

that, between 60 percent and 65 percent of all boreholes in Kieni either do not function at all, or operate significantly below designed expectations (KFSSG, 2012). This, therefore, called for an investigation into the causes of non-functionality and poor performance of these water projects in order to find solution.

1.1.3 Capital Structure of Community Water Project

Capital structure refers to composition and proportion of different sources of funds such as equity finance, that is owners' contribution, debt finance, that is funds from sources which must be repaid and grant finance, that is, free funds not to be repaid. In Kenya, capital structure in the water sector relies on grants from the donor and government funds for planning, designing and implementing infrastructure projects and occasionally subsidizing maintenance and operating costs (World Bank, 2011). In addition, there has been negligible role played by private sector in financing infrastructure development projects through equity and debt especially from commercial banks (World Bank, 2011). Therefore there was need to establish the reason why water projects do not utilize debt financing option. According to Non Profit Finance Fund (2009), lack of consideration of the balance between mission, goals and target, and capital structure destabilize the ability to operate effectively. This implied that, capital structure too can be one of the key component of ensuring functionality and sustainability of community water projects. That is, capacity and mission of community water project management of supplying water to community can be influenced by capital structure.

Sustainability of community water project depends on funds available, which is influenced by designed capital structure. Water projects sustainability cannot be ensured unless the costs for operations are recovered. These costs include the repair and maintenance costs, operation costs, or rehabilitation costs (Briscoe & de Ferranti, 1998). Water user fee was therefore an important source of funds for operations and maintenance of community water projects. A World Bank evaluation report on Community Water Management in Paraguay argued that, sustainability was boosted when tariffs generated enough funds to finance the expansion of the service to the new customers, meet the operation costs and replacement costs of the water system

after and during its useful life (Paraguay ICR, 1999). In connection to this, World Bank (1993), argued that government resources worldwide no longer able to cater for all the expenses involved in the provision of potable water services, even to the low income communities in rural areas only. In addition, unsustainable use of water is greatly perpetuated by provision of free water. Free water provision was partly responsible for the poor financial stability of water facilities in developing countries, especially for community water projects. Free water provision also led to misuse of this important but scarce resource (World Bank, 1993).

1.1.4 Management of Community Water Projects

Management of community water project referred to people mandated to initiate and run a community water project. Management of community water project was an important factor in raising capital as well ensuring sustainability of community water projects. Management ability had a direct influence on community's involvement and contribution of own resources, equity finance, from community members that was expected to enable community members to take total control and ownership of the water supply facilities and leads to community empowerment (Mahama & Badu-Nyarko, 2014). According to Binder (2008), sustainability of a water project was highly influenced by effective operation and maintenance (O & M) of rural water supply systems. Effective O&M were the responsibilities of the management of a water project and therefore an important element for sustainability. Other responsibility of management of a community water project included community involvement in planning and running of rural water projects and initiation of community active participation in the water project. Active community participation was expected that it led to ownership of the project by beneficiaries and which was expected to improve sustainability.

Management also had a bearing on collection and utilization of water user fee or tariffs (Binder, 2008). Kafakoma and Silungwe (2003) submitted that for a water project to be sustainable, a well-structured communication network was key to ensure that community who were beneficiaries, were aware of the project status and affairs. Information that needed to be disseminated included updates on prices for equipment,

changes in government policies, water materials, and important announcement of meetings, visits by donors among other things. Management of community water project, therefore, was an mediating variable that influenced the relationship between capital structure and sustainability of community water projects.

1.2 Statement of the Problem

Access to safe drinking water results in significant health, economic, and social gains since it contributes towards healthy communities. No economic activity can take place without water. All living organisms including human beings require water for survival. Access to safe water is pegged to functioning and sustainability of the water systems. The low levels of sustainability of water projects reduced the chances of achieving the Millennium Development Goals, which was to half the proportion of people globally without access to safe drinking water (UN, 1992). In Africa, 300 million people lack access to drinking water (African Development Bank, 2005). A survey of 11 countries in Sub-Saharan Africa revealed that, the proportion of functioning water projects ranged from 35-80 per cent (Sutton, 2004). Studies on sustainability of rural water projects in different countries in Africa by Harvey and Reed (2007), Adida (2012) in Western Kenya, Beyene (2012) in Ethiopia, Musonda (2004) in Zambia, Abrams (1998), Mukherjee and Van Wijk (2002), and Shaw (2012) in Zambia, identified factors such as financial and economic issues; non supporting policy context; non-flexible institutional arrangements; community and social aspects; lack of spare parts supply; poor technology and the natural environmental issues; poor maintenance of projects; and lack of proper monitoring as the ones affecting rural water supply projects. Shaw (2012) indicated that, rural community water projects collect insufficient funds to cater for the required repairs and proper maintenance which led to lack of sustainability of rural water supply projects. None of these studies focused on capital structure as influencing sustainability of water projects.

In Kenya, 41 per cent of Kenyans do not have access to adequate drinking water supply through point sources, piped systems, and rainwater harvesting systems (World Bank, 2011). In most rural areas, water access was estimated to be 52 per

cent. Only 12 per cent of the rural population was served by piped household connection, translating to 3.7 million people (World Bank, 2011). In Kieni Constituency, Nyeri County, Kenya, majority of the community water projects were not operating at full capacity, with between 60 percent and 65 percent of all boreholes in Kieni either did not function at all, or operate significantly below designed expectations (KFSSG, 2012). This constituency also borders both Aberdare water catchment and Mt. Kenya water tower, yet majority of the communities living there did not have adequate water for domestic as well as agricultural activities.

A study by Ryan (2001) found out that, performance of any organisation and capital structure are inseparable. This meant that, capital structure had an effect on performance and sustainability of community water project. Studies on extent to which performance of different organisations was influenced by capital structure by Siro (2013), Otieno (2012), and Kamau (2010), found out that, there was a relationship between capital structure and financial performance of listed firms in Kenya. In contrast, Murakaru (2013) found out that, there was significant positive relationship between debt and profitability which implied that, an increase in debt position of an organisation was associated with increased in profitability, meaning debt improved firm's performance. These findings related to those of Orua (2009) which revealed that, generally highly leveraged Micro finance institutions (MFIs) were found to perform better by reaching out to more clients. Therefore, debt finance could influence sustainability of organizations including community water projects.

According to Kinzinger (2010), chances of sustainability of a community project increases with increase in community contribution or equity. Therefore, this study sought to investigate the extent to which sustainability of community water projects was influenced by equity financing in Kieni Constituency in Nyeri County, Kenya.On grant financing, most community water projects in Kenya relied on grants from the Government and donors (World Bank, 2011). However, despite the achievements grants financing has had over time in community empowerment, scholars have had a different view. Adam and Bevan (2006) and Nkusu (2004) noted that, aid leads to a "Dutch Disease Syndrome", which meant, aid can leave a self-sustaining community

worse-of once it is withdrawn. In addition, grants had a negative effect on long-term sustainability of development projects since it created "mission drift" as project management attempted to align themselves to donor's interests (Foster, 2003; Young, 2002). There was need to assess influence of grant financing on community water projects. This study therefore, sought to investigate influence of capital structure on sustainability of community water supply in Kieni Constituency, Nyeri County, in Kenya.

1.3 Purpose of the Study

The purpose of the study was to investigate influence of capital structure on sustainability of community water projects in Kieni Constituency, Nyeri County. The study focused on influence of equity financing on sustainability of community water projects. Equity financing referred to contributions either in cash or in kind (labour) by the community or beneficiaries of a community water project. It also assessed the extent to which grant financing, debt financing and water user fees influence sustainability of community water projects in Kieni Constituency, Nyeri County, Kenya. Combined effects of these variables formed capital structure whose influence on sustainability of community water projects was investigated. The last objective of the study was to assess the intervening effect of management of community water projects on the relationship between capital structure and sustainability of community water projects. Research questions and hypotheses were framed based on these variables and tested using both inferential statistics and descriptive statistics.

1.4 Objectives of the Study

The study aimed at achieving the following objectives, to:-

(i) Establish the extent to which equity financing influences sustainability of community water projects in Kieni Constituency.

(ii) Assess the extent to which grant financing influence sustainability of community water projects in Kieni Constituency.

(iii) Examine the influence of debt financing on sustainability of community water projects in Kieni Constituency.

(iv) Establish the influence of the water user fees on sustainability of community water projects in Kieni Constituency.

(v) Investigate influence of capital structure (combined influence of equity financing, grant financing and water user fee) on sustainability of community water projects in Kieni Constituency.

(vi) Explore the extent to which management mediates the relationship between capital structure and sustainability of community water projects in Kieni Constituency.

1.5 Research Questions

This study aimed at answering the following research questions:-

(i) To what extent does equity financing influence sustainability of community water projects in Kieni Constituency?

(ii) How does grant financing influence sustainability of community water projects in Kieni Constituency?

(iii) To what extent does debt financing influence sustainability of community water projects in Kieni Constituency?

(iv) In what way does the amount of water user fee charged influence sustainability of community water projects in Kieni Constituency?

(v) In what way does capital structure influence sustainability of community water projects in Kieni Constituency?

(vi) Is there any intervening effect of management on the relationship between capital structure and sustainability of community water projects in Kieni Constituency?

1.6 Hypotheses of the Study

The study tested the following hypotheses:-

H_{01} There is no significant relationship between equity financing and sustainability of community water projects

H_{02} There is no significant relationship between grant financing and sustainability of community water project

H_{03} There is no significant relationship between debt financing and sustainability of community water projects

H_{04} There is no significant relationship between amount of water user fees and sustainability of community water projects.

H_{05} There is no significant relationship between capital structure and sustainability of the community water projects.

H_{06} There is no significant mediating influence of management on the relationship between capital structure and sustainability of the community water projects.

1.7 Significance of the Study

The study can be of importance to policy formulators in water sector; water donors; community water management; the community as beneficiaries of water as well as scholars in community development, water sector and finance sector.

1.7.1 Policy Formulators

The findings of this study can be of importance to policy formulators in the Ministry of Water and water parastatals such as Water Regulatory Management Authority, Water Services Boards and to the Government of Kenya at large. The finding can inform policy formulators on appropriate capital structure for community water projects. It can help in crafting a policy on designing ways of utilizing debt finance in community water projects. It can also be of importance on how grants can be properly utilized to increase sustainability of community water projects.

1.7.2 Water Projects Donors

It can be of great importance to the international organizations such as World Bank, European Union, International Fund for Africa Development, JICA, Action Aid and other foreign donors as well as local organizations that fund water projects such as Safaricom in designing optimal capital structure and devising ways of ensuring sustainability of initiated water projects in order to have positive impact in long term. Based on the findings, the donors can be able to know the better ways to finance

water projects, what the community should provide as capital, amount of debt finance that can be borrowed and amount of user fee that will ensure sustainability of community water projects. Due to the negative relationship between grants and sustainability, donor can be able to devise ways of making grants more effective such as, providing grants with conditions of repayments.

1.7.3 Management of the Community Water projects

At the community level, the findings can be of importance to the communities especially in designing capital structures for their water projects that is how community projects can utilize debt finance, set optimum water user fee, and appropriate amount of community contribution, that is equity financing. The study found out that, debt finance were not utilized, based on this finding, the management of community water projects should explore ways of utilizing debt financing to boost their capital thereby increase ability to adopt new technology, expand their water coverage and set up better structures such as offices, filing systems and record keeping, which will improve efficiency and facilitate smooth running of water projects..

1.7.4 Significance to Scholars

In terms of theory, limited studies were done on influence of capital structure on non profit making organisation. This study bridged this gap by investigating influence of capital structure on sustainability of community water projects which is an example of non-profit making orgainisation. Other scholars can build on further by investigating the influence of capital structure on other non-profit making sectors.

1.8 Delimitation of the Study

This study was limited to Kieni Constituency in Nyeri County. The constituency had two districts, namely, Kieni East and Kieni West Districts and borders Laikipia County to the North, Mount Kenya to the East, Aberdares to the West and Nyeri Central and Mathira to the South. The study was also limited to community water projects. Therefore, individual, private companies and public water providers companies were excluded from the study.

1.9 Limitations of the Study

The population of the study was largely rural and illiterate. According to Kenya (2014), Nyeri County almost half of the rural population cannot read full sentences. Therefore, this required researcher's interpretation of the questions in the questionnaire. To overcome this, the study recruited research assistants from the local population competent in local language and trained them thoroughly and in addition, allowed respondent to have an interpreter of their choice. Most water project activities were conducted informally without following any proper formal framework, for example, most did not have offices, and therefore the chairman had to be physically traced from home.

1.10 Assumptions of the Study

The study assumed that, the respondents gave accurate and truthful data for valid conclusions.

1.11 Operational Definition of Terms

Capital Structure Capital structure refers to the proportion of different sources of finance used to construct and maintain community water projects. Such sources of finance include equity, debt, grants and water user fee. The aggregate of the sources of funds is capital structure.

Community water Projects Refers to water provision projects initiated in rural community and managed by communities themselves. They include gravity water projects, boreholes, dams and water pans.

Debt Financing- Refer to funds acquired for the purpose of the community water project, and have to be repaid back. Such sources may include banks and other financial organizations.

Equity Financing- Equity finance is the finance provided by real owners of the business, that is, the ordinary shareholders who are real owners of the company. In this study, equity refers to the funds provided by the beneficiaries of the water projects or the

community for the purpose of building and maintaining the water projects.

Grant financing- This is the amount of funds given to community water project by people or institutions without expectation of being paid back.

Management of Water Projects This refers to the composition of leaders who engage in planning, organizing activities of the water projects, raise and control funds and other resources, in charge of repair and maintenance of community water project. Management in this study was assessed by the combined aggregate of management ability to run the water projects, level of community participation, level of financial skills and ability to raise funds for the water projects.

Sustainability of the Community Water Projects-Refers to the ability of a community water project to provide water consistently and the right quantity as per set design over a long period of time. It was assessed by adequacy of water provision by water projects, status of community water project infrastructure and level of functionality of the water systems.

Water User Fee This is the amount of money the beneficiaries of the water projects have to pay for utilizing the water from the community water project.

1.12 Organization of the Study

This study is organized in five chapters. Chapter one covers introduction of the study which contains background of the study which informs the study, statement of the problem which was the gap that the study aimed at bridging, purpose of the study, objectives to be achieved, research questions to be answered, significance of the study, limitations and delimitation and assumptions of the study and definition of significant terms. Chapter two covers literature related to the study. It covers

Sustainability of Community Water Supply Projects, Capital Structure and Sustainability of Water Projects, Theories of Capital structure, Debt financing, Grant Financing, Equity Financing, Water Tariffs or User Fee and Sustainability of Water Projects, Management and sustainability of water project, Government policy, Conceptual framework and Knowledge gaps. Chapter three covers the philosophical foundation of the study, research design, study population, sampling and sample size, data collection tools, instrument validity and reliability, methods of data analysis and ethical considerations of the study.

Chapter four covers analysis of data which were done by descriptive statistics and inferential statistics. Analyzed data were presented in tables followed by interpretation and explanations in words and discussion. The chapter covers response rate, background information of the respondents as well as the community water projects. This is followed by analysis of functionality and sustainability of water projects, equity financing, grant financing, debt financing, water user fee, effects of capital structure on sustainability of community water projects and management of community water projects. Chapter five covers summary of the major findings, conclusions and recommendations.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter reviews the relevant literature on water sector and financing, influence of capital structure of water project, management, community participation and water user fee on sustainability of community water supply projects. The chapter covers capital structure and sustainability of water projects, theories of capital structure, equity finance and sustainability of water projects, grants and sustainability of water projects, debt finance and sustainability of water projects, water tariff or water user fee and sustainability of water projects, sustainability of water projects, management and sustainability of water projects, theoretical framework, a conceptual framework and knowledge gaps.

2.2 Water Sector and Financing

Water is one of the most important natural good globally that is indispensable for existence of all living organisms. Water is vital in maintaining good health, food growing, and management of the environment. Water is therefore at the center of all economic and social development. However, World Bank (2013) documents that, over 783 million people globally were without access to clean and reliable water sources. In Africa, 300 million people lacked access to safe drinking water while those that have no access to sanitation were 313 million. In addition, the lowest water supply coverage among continents in the world, Africa was leading (African Development Fund, 2005). Lack of water and sanitation posed great development challenges to most of the countries, as it impacted public health, education, and the environment. Globally, poor sanitation and lack of clean water led to 700,000 premature deaths annually. This accompanied with the cost of health care treatment, finding access to sanitation facilities and lost time in productive activities while seeking treatment, led to huge economic costs to the countries and households especially in rural areas (World Bank, 2010).

According to WHO and UNICEF report about Kenya's water and sanitation sector, 41% (48% in rural areas and 17% in urban areas) had no access to drinking water

sources (WHO & UNICEF, 2013) meaning 41% do not have access to drinking water. As a result of lack of water, huge investment in water projects had been done especially in rural areas.

Water projects require large amounts of resources to establish and sustain. Water supply, wastewater, and related hydro projects are amongst the most capital-intensive of infrastructure investments (UNEP, 2006). The global water infrastructure spending had risen to $ 22 trillion (United States Environmental Protection Agency, 2014). In Kenya for instance, total budgetary expenditure on water supplies development increased by 29 per cent to Ksh. 34.4 billion in 2013/14 from Ksh. 26.5 billion in the financial year 2011/12 (Republic of Kenya, 2013). Water supplies project assets and infrastructure are cannot be of use for any other purpose and therefore have very low resale value. Hence an external investor or lender to a water project depends totally on future expected revenues for repayment or dividend. As a result most financial institutions that provide debt finance are normally reluctant to advance loans to water projects due to lack of assets with high resale value. This is because, at the point when the water project is completed, the investor or lender largely is at the mercy of the water projects' authorities or community water project managers (UNEP, 2006). This is because recourse is not possible since water project assets are highly specialized and do not have high resale value outside water projects.

In addition, water projects do have risks. The existence of these project risks, have financial implications on capital structure. According to UNEP (2006) water related risks that influence financing of water projects include commercial risk, for example, amount of tariff raised for operations and maintenance, cash flow profile and credit risk; political risks which include expropriation, political interference; legal, regulatory and contractual issues , such as law and contract enforcement and regulation; water resource risks for example, scarcity, flooding, pollution, reallocation; reputational risk, such as, compliance with good practice, corruption, stakeholder activism among others (UNEP,2006). Banks, donors and community members or beneficiaries of water projects are exposed to these water related risks which influence amount of capital that a community water project can raise. Such

risks be can be mitigated by a careful finance package mix of equity, debt water user fee and grants if available. The existence of these risks, therefore, results to different capital structures for different water projects.

2.3 Capital Structure and Sustainability of Water Projects

Capital structure refers to composition and proportion of different sources of funds such as equity finance, that is owners' contribution, debt finance, that is funds from sources which must be repaid and grant finance, that is, free funds not to be repaid. Capital structure varies for profits and non-profits organizations and is critical for performance and survival of an organisation, though there is no right kind (Nonprofit Finance Fund, 2009;Miller 2002). Insufficient working capital in organizations in most cases led to cash flow problems that starve organization's activities such as innovation, staffing or normal operations, due to illiquidity (Miller, 2003). Ignoring the balance between capital structure and organizations capacity and mission, could affect the functionality of the organization (Non Profit Finance Fund, 2009). Inadequate funds resulting from a capital structure which over depends on Government funds and donors for water projects in Kieni constituency was a factor resulting to lack of sustainability of water projects.

An appropriate definition of capital structure was drawn from Myers (2001) who stated that, capital structure was the mix of financing sources and securities used by organizations in their investments. A community water project for example, needs to commit funds in order to functionally remain operational and have some growth. The literature on the capital structure was predominantly based on the work of Modigliani and Miller (1958). Modigliani and Miller concluded that, capital structure does not affect firms performance. Their thesis was based on the efficient market hypothesis which assumed that the markets were frictionless. Factors such as transaction costs, inflation and taxes, were inexistence. In their second thesis, Modigliani and Miller issued a 'correction' in which they argued that although the value of the firm does not change with changes in the debt/equity ratio, there are two major points to note when taxes and other transaction costs are brought into consideration. These are summarized by Firer, Ross, Westerfield and Jordan (2004) as follows: with

increasing debt/equity ratio, the firm's weighted average cost of capital (WACC) decreases. This is because the cost of debt is lower than the required return on equity. They noted that, the firm's cost of equity increases with increasing debt/equity ratio since the shareholders bear a higher business risk as a result of increased likelihood of the bankruptcy of the firm. Modigliani and Miller (1963) concluded that capital structure is important in the real business environment with inflation, taxes and bankruptcy cost. Little had been done on influence of capital structure on community projects whose main objective was not to make profit.

Schwartz and Aronson's (1967) concluded that different industry sectors had significantly different capital structure. They inferred that firms in a particular industry develop an ideal financial structure that is as a result of their asset structure and operational risks. They also noted that specific capital structures to change over time. They have observed that the capital structure of firm was dynamic as it maximizes its value. Such position is the optimal capital structure. Myers (2001) observed that with inflation and taxes, the trade-off theory emphasized taxes, the pecking order theory accentuated differences in information, and the free cash flow theory highlighted agency costs. Each of these theories is reviewed in subsequent sub-section 2.11.2 in this chapter.

Healthy capital structures are hard to maintain in the non-profit sector due to restrictions on assets (McLaughlin, 2000), and that includes community water projects. Community projects lack assets which could act as collateral for debt finance therefore have a restricted capital structure. For any entity, cash is the primary hedge against risk and crises (Miller 2002; McLauglin 2000). When most of an organization's resources are placed into "fixed assets" such as water project facilities and restricted endowments, organizations lose their capacity to adapt and therefore can become more risk averse (Miller 2002). These fixed assets can appear to strengthen the balance sheet, however, it is not the total positive balance of an organizations net assets that indicates its health and flexibility, but the liquidity of its net assets (Non Profit Finance Fund, 2001). This was a similar situation as in most water projects, a big proportion of funds go to infrastructure such as piping. This

infrastructure have very low resale value therefore are limited in terms of liquidity. They also are capital intensive and take huge sums of money to construct and maintain. This normally leaves the management with little cash for operations and maintenance there by leading to lack of sustainability due to lack repairs of the project facilities.

A healthy capital structure is a necessary consideration for profit and non-profit organizations such as community water projects, and it is something that can help achieve project sustainability. As Ryan found out that, performance and capital are inseparable (Ryan 2001), and consistent performance leads to sustainability of any venture. Siro (2013) in his study on effect of capital structure on firms listed at Nairobi Securities Exchange found that, there was an inverse relationship financial performance and between capital structures of listed firms in securities exchange in Kenya. The findings also indicated that the higher the debt ratio, the less the return on equity which therefore supports the need to increase more capital injection rather than borrowing, as the benefits of debt financing are less than its cost of funding. A similar study by Otieno (2012) on capital structure and performance at Nairobi Stock Exchange (NSE) found out that, leverage (debt finance) has effect on performance only to the extent that long term debt to equity ratio and total debt to total assets ratio are used as measures of leverage, the correlations are too low. That is there was low relationship between capital structure and performance at NSE.

In contrast, Murakaru (2013) in his study on relationship between profitability and capital structure of listed construction firms at Nairobi Securities Exchange found out that, there was significantly positive relationship between debt and profitability which implies that an increase in debt position is associated with an increase in profitability hence firm's performance. In another study by Kamau on the relationship between financial performance and capital structure of insurance companies in Kenya and found out that, debt to equity ratio accounted for a smaller percentage of financial performance of all three types of insurance companies. There was a positive but weak relationship between financial performance and capital structure (Kamau, 2010). These are two contrasting findings on effects of capital structure that can be attributed

to different types of business ventures, that is, one is listed companies and the other unlisted constructing companies. Therefore there was need for a study to investigate influence of capital structure on sustainability of water projects.

In another study by Rao (2013) on financial sustainability and sources of funds of water sector institutions in Kenya, the study concluded that funding sources affects the financial sustainability of water organizations. On the study objective, the ratio analysis revealed a strong positive relationship between internally generated funds as one funding source and financial sustainability of water sector institutions in Kenya. On the other hand the regression analysis revealed that when all factors held constant, a positive relationship is seen on financial sustainability with an increase in government grants, donor funding, internally generated funds and reserves. This study focused on capital structure, that is, how different sources of finance affect sustainability of community water projects. It investigated both internal and external sources of finance and their influence on sustainability of water projects. Internal funds include funds generated from water user fees and equity contributed by beneficiaries of the water project while external include debt finance and grants from donors.

In another study by Orua, generally highly leveraged Micro Finance Institutions (MFIs) were found to perform better (Orua, 2009). It was found that, such MFIs with high debt enjoyed economies of scales and therefore enhanced their ability to manage risks. This study put emphasis on influence of capital structure on financial performance which is an important element in sustainability of any project. However, Modigliani and Miller (1958) found out that, in a perfect market, how a firm is financed is irrelevant to its value. That is capital structure of the firm does not influence the value of the firm. These contradictory findings of different studies provided the base for which to examine influence of capital structure on sustainability of community water projects.

2.4 Equity Financing and Sustainability of Water Projects

According to Manas'she (2001), equity finance is the finance provided by real owners of the business, that is, the ordinary shareholders who are real owners of the company.

The owners have voting rights which may disorganize a company's policy in case shareholders votes are cast against the company's present operations. In most companies this forms the largest source of finance to any limited company and usually forms the base on which other finances are raised. It is a permanent source of finance to a company which can only be refunded only during liquidation. This finance does not increase an organizations gearing level, on the contrary, it decreases the gearing level. In a community water project, equity was what the community or beneficiaries gave as their contribution, normally they provided labor or cash.

According to World Bank (1992), people's participation in capital contribution had advantages, such as, it fosters community assistance in local implementation; wins support for project objectives; and it helps resolve conflict over resource use. Gow and Franken (1994) study posits that, a sure community participation in projects such as financial contribution enhances sustainability of benefits and accountability. Community water projects, in which trust vested in effective social structures is backed by capital contribution, explicit rules and enforcement mechanisms, are more likely to get cooperation and support than projects whereby communities do not participate actively and do not provide their own resources (Kikula, 1999; Nyong & Kanaroglou, 1999). This therefore meant equity contribution increased support and cooperation of community members toward a project leading to increased chances of sustainability of the projects. According to Kinzinger (2010) on his study on project sustainability and self-funding as a guiding principle, he observed that, where it did not diminish mission, community or self-funding, if complemented by organization accountability, had a net quantitative benefit on project sustainability and a net qualitative benefit on persons impacted by the project when community contribute resources to a projects. This meant that chances of sustainability of community water project increased with an increase in community contribution or equity.

In addition, in order to ensure sustainability of a community water supply, its initiation and implementation should be demand driven and not supply driven. Demand driven means that, the community's need for water should inform community water projects initiation. Outsiders should not initiate community water

project just to supply water. According to Tadesse (2013), community water supplies implemented under Supply Driven Approach (SDA) had failed to provide low income communities with sustainable water supply and is the reason there had been a shift from SDA to Demand Responsive Approach (DRA). This later approach enabled the user community to initiate projects, decide on the technology type and commitment to take care of future responsibilities attached to the project. In this case community participation enables the beneficiaries to have a say in the management of the projects rather than just being recipient of project benefits. Mahama and Badu-Nyarko (2014) supported this through their findings in the study carried out in Ghana which established that involvement of community members from planning of water projects to utilization level led to community empowerment. The community members were enabled to take total control, ownership, maintenance and sustainability of the water supply facilities. The best way community can take control of their project was through contribution of resources so as to have a stake in the community project. In a study on factors influencing community participation in project planning in Kenya, Kamuiru (2014) observed that community support for the project is an important ingredient in determining the success of the project.

The contribution of unpaid labour by the community to projects, was widely accepted as the only way most low income communities participated in development initiatives. Labour contribution was a form of equity contribution to development initiatives. Most development partners believed that, as long as local community volunteer labour, 'acceptance' of the project was guaranteed as well as full participation by the community. Kleeimer (2002) documented that, one donor in Tanzania paid community members to provide unskilled labour. This was largely symbolic with no effect on active participation. Development agencies involved in rural water supply projects had to re-evaluate their active role in community projects. Therefore, new perspective that allowed the shifting of responsibility of constructing and financing water projects from development agencies and governments to the local communities. This was expected to boost sustainability of water projects through equity contribution by the community members or beneficiaries.

Briscoe and de Ferranti (1998) noted that, effective community participation had shifted to the bottom-up approach from traditional top-down approach. This involved devolution of power to empower a community, decentralization of unevenly distributed resources and allow mobility of true people involvement in financial resources. Therefore Equity contribution by water beneficiaries of a community water project allowed proper participation and empowerment of the key stakeholders in the project. Chogul (2000), in her study on housing sector in developing countries, found that top-down or bottom-up approach to development, led to different results depending on the degree of the confidence and ability of the community to contribute resources to its own development and the governmental willingness and ability to initiate quality projects. Therefore, equity contribution by the community was a key component that affected sustainability of water projects positively.

According to Beyene (2012), in his study the sustainability of rural water supply projects in Ethiopia, in MechaWoreda, only one of the 21 (5% percent) of water projects initiated without community support was still functioning. In contrast, only 12 of the 142 (93 percent) of the water projects initiated with community involvement failed. The reasons of abandonment of dug wells and boreholes, despite full participation of communities initially during planning and implementation, was very weak institutional support of the water supply projects due to understaffing of the Woreda office. Another reason was lack of proper maintenance of the initiated water projects. A study carried out by the International Labour Organization of 'poverty-oriented' projects worldwide, found out that, community participation strategies in rural development meant nothing if there was no technical transfers to a local community aimed at boosting capacity (Sustainable Development Department, and Food and Agriculture Organisation of the United Nations, 1997). Most failed strategies in provision for water to low income communities, was due to lack of consultation with the rural community and low active participation by communities. This situation is exacerbated by lack of proper organizational structures to represent the interests of the community. Furthermore, in a community where illiteracy and lack of education, and proper organizational structures, participation in most cases did not advance to the lowest community level. In most cases, information dissemination

is a one-way flow to the water beneficiaries. Most poor community do not take initiative and nor articulate their demands, and hence end up being 'spoon-fed' on 'pre-packed' solutions to their problems. This can be attributed to lack of provision of resources (equity finance) by the community that denied them right to question pre-packed solutions to their problems. This hindered the development of a sense of ownership towards the project. Most of the time, lack of active participation led to collapse of community projects (Nyong & Kanaroglou, 1999). Narayan (1995) and Oyesiku (1998), emphasized that, without community contribution, there was little likelihood of sustainability being realized. Therefore, based on these findings, community equity contribution was expected to positively influence the level of sustainability of community water projects.

2.5 Grant Financing and Sustainability of Water Projects

A grant is a financial or material resource given by a donor or funding agency for the purpose of achieving specific objectives and contributing towards predefined goals and without expectations for repayment (Miller, 2002). Despite aid being free money and major source of water infrastructure development money, aid or grants may be project tied and may lead to implementation of projects that are not priority projects especially if the recipient government or communities have little to say in their choice (Miller, 2002). The conditionality often associated with foreign aid may adversely affect certain sector of projects leading to lack of sustainability. Adam and Bevan (2006) and Nkusu (2004) added that, aid leads to a Dutch Disease Syndrome. This is a situation created by large inflows of foreign aid to country that results in lack of sustainability of development projects. The theory explains that large windfalls such as foreign aid have a negative effects communities' productivity by impairing their competitiveness. The argument is that development aid might restrain progress of the community and undermine growth of the recipient of the aid (Adam and Bevan 2006; Nkusu 2004). This syndrome could affect the community's motivation to monitor effectively water projects in Kieni since community members believe "it is not their money" that has been used in the project leading to negative effects such as neglect and lack of active participation on water projects issues thereby affecting sustainability of community water projects negatively.

Fungibility was another negative effect of development grants and aid. Aid intended for the social and economic improvements in standards of living, may result wastage of the funds and other resources they would have been spent on improvement of welfare (Swaroop & Devarajn, 1998). In a community water project, grants may free the households' funds that should have been put in the project to other anti-development social activity such as heavy drinking of alcohol which Nyeri County residents are notorious in, thereby making the community worse off.

In addition, grants have a negative impact on projects' long-term sustainability. This is because it creates "mission drifts" as project management attempt to satisfy each funder's interests (Foster, 2003; Young, 2002). Pratt (2002) observed that, organizational shifts are in response to shifts in revenue and income, not intent. According to Keating (2007), a project-based funding results in the "current service trap" in which projects will prioritize there services delivery based on the funders' standards and conditions rather than focusing to ensure long term sustainability of development projects. Miller (2002) opined that, donor restrictions create demands on capacity and program beyond what was initially envisioned or planned for the project thereby increasing risks and expenses to the projects.

Rosenberg and Taylor (2003) recommended "capital budgeting" for all projects including non-profit community projects. This meant that project managers should look at the financial implications of projects and how to raise fund to finance them over the long term. In addition, grants or aid generally does not include an allocation for overhead expenses. Young (2002) noted that most grants from donors do not meet the full costs of a project, especially operating expenses of the project. Most projects scramble for additional funds, and Young argued that in most projects the cost of obtaining extra funds and resources are usually high and do not benefit the projects (Young, 2002).

Lastly, projects that source funding from many donors, may receive support from a variety of them. All of them may have different expected desired outcomes. Adhering to these expectations of too many donors could dilute an organization's impact there

by affecting project sustainability (Pratt 2002; Burd 2009). For example, some community water projects in Kieni were financed by European Union, JICA, Action Aid, and Government, which makes accountability a problem due to multiple reporting to these funders.

2.6 Debt Financing and Sustainability of Water Projects

Debt is a "financial instrument that breaks the timing link between the payment for the good and consumption of a good" (Yetman, 2006). "Interest is the miraculous device that lets us disconnect our consumption from our cash flows so that the two no longer have to be synchronized" (Yetman, 2006). In order to make debt successful, it is importance to match expenses over the useful life of the acquired asset (Miller, 2008). In most cases, long-term debt was associated with the financing of facilities such as housing and commercial real estate, hospitals, universities and non-profits working in low-income housing (Emerson, 1999, Yetman 2006). In a study by Yetman, community water projects were not considered or thought that they can utilize debt finance and is a gap that this study will aim at filling. Only large non-profit organisation received long-term debt financing via the financial markets (Miller, 2008). In Kenya, it is only Central Bank that sells Government Bonds through the Nairobi Stock Exchange (Central Bank of Kenya, 2009). Local water projects cannot raise its funds through bonds in Kenya but can get a loan from financial institutions such as banks.

Interest in debt finance is tax deductible expense (Modigliani & Miller, 1963). Hence debt financing gives rise to tax shelter to a community water project. Modigliani and Miller continue to assert that, debt financing enhances company value. However, debt makes a company lose flexibility. Loss of flexibility can erode shareholders value. Modigliani and Miller added that, the existence of a tax exemption advantage of debt financing, does not necessarily mean that projects or organizations should at all times sought to use maximum amount of debt in their capital structure (Modigliani & Miller, 1963). There are limitations imposed by lenders as well as many other dimensions in real world problems of financing strategy such as rubric need for flexibility. For a rural water project, the Government protects them from taxes since

such projects are non-profitable. Therefore, they can enjoy the tax shield but lose flexibility. Debt financing bring about loss of flexibility and liquidity crisis which may adversely affect operating policies. Thomas E. Piper and Wolf A. Weinhold said "managers fearful of incurring liquidity constraints or of violating debt covenants will usually trim strategic expenditures, be unaggressive in exploiting market and investment opportunities and base operating policies on low end of range of sale forecast" (Thomas & Wienhold, 1982). These two scholars see the negative side of debt financing in that fear of violating debt covenants could result in constraining management in exploiting opportunities for the betterment of the projects. This fear of default in repayment could push management of water projects to opt for other sources of finances.

On the other hand, Shapiro found the advantage of debt financing in a corporation. He noted that, since the modern corporation, shareholders are not able to organize themselves effectively given that they lack the required incentives to supervise management behavior. Hence, very little monitoring takes place. One way of ensuring low cost monitoring may be commercial banks or lending institutions through acquiring debt financing (Shapiro, 1991). When a bank gives a loan it conveys two positive signals. One, the bank consider the firm to be sound and credit worthy, and two, the bank will monitor the firm on a regular basis to ensure that the management behaves well (Shapiro, 1991). For Kieni constituency water projects, monitoring could be a problem since majority of locals are illiterate, lack monitoring skills or may lack time to monitor such water projects. Lending institutions could be the answer to such a problem through debt financing.

According to Chandra (2008) financial institutions and banks are often the principal providers of debt capital. They are more comfortable in lending against stable, tangible assets like machinery. Hence if a firm has stable tangible assets it may borrow more. For a community water project, tangible assets are lacking. Most of the assets belonging to a community water project are mostly specialized equipment for water services only and hence have low resale value. This therefore means that they cannot be used as collateral for loans.

According Pandey (2005), the firm's costs of capital will be the overall rate of return on the investment project. The firms' cost of capital can be used for discounting the cash flows of those investment projects thereby becoming average risk. A sound investment project requires a rate of return equal to the firms' cost of capital depending on the risk. For a community water project, to determine future cash inflows based on water user fees and ability of the projects' beneficiaries to pay can pose as a challenge in accessing debt finance.

Debt brings about financial distress and at the same time, it provides low cost monitoring. Financial distress of debt include problems ranging from liquidity shortages to bankruptcy (Pandey, 2005). That is, a community water project that has debt finance will be required to make repayments at agreed durations. These repayments will reduce the liquid cash or working capital which could have been used in taking care of recurrent expenditure such as repairs. The problem of financial distress will be magnify with an increase in financial leverage. Beyond a certain point the financial distress will out way the tax and other benefits that accrue as benefits of debt financing.

2.7 Water User Fee and Sustainability of Water Projects

Community Water supply project is a service, and just like any service project it requires manpower, spare parts, repairs, energy and other inputs. According to Wyatt (1988), these requirements need funds. Hence, in order to implement and operate a sustainable water supply project, a cost recovery system must be in place. Establishment of water supply projects involve costs which must be incurred at the design stage, construction phase and in the operational phases of any water supply project. However, these costs depend on the type of management practices, technology used, and the geology. The costs can be classified into subunits as proposed by Whittington (2003) namely: Transportation costs for instance major pipelines and pumping facilities; production costs such as reservoir, tanks, pumps and treatment plants; distribution costs which include, metering and local reticulation; connection costs and administrative costs such as office expenditure, collection, billing and customer relation. Cost recovery systems were normally user fees of

water tariffs, that is levying fees for water usage. This study sought to investigate influence of water user fee on sustainability of water projects since water tariff affect working capital of a water project.

Levying of water tariffs was subjected to two ideological views according to Whittington (2003). One view water as a social good that should not be charged hence provided for free and the other view, water as an economic good that should be priced and not provided for free. However, Boland and Whittington (2000) noted that, over time, there has been consensus that water should be priced, but there was still a disagreement on what is a fair price for water.

According to Nyoni (1999) water pricing in the form of water user fee was based on user pays principle. This is whereby users are charged for the water usage and services provided. World Bank (1993) argues that, government funds can no longer provide for all the expenses and costs associated with the provision of water services. Free water supply promotes unsustainable use of water and encourages wastage. Free provision for water was viewed as responsible for the poor financial performance and stability of water utilities in poor economies. The argument was that, with increasing debt burden on state budgets, governments can no longer afford to provide water for free. According to Harvey and Reed (2004), sustainability of rural water project demands community financing and creation of efficient systems of operation, maintenance and repairs. According to Whittington *et al* (2008), a minority of rural communities in Ghana, Peru and Boliva were not collecting sufficient revenues to cater for operations and maintenance costs. In addition a significant minority of water projects were not collecting revenues at all. This led to breakdown and non-functionality of community water projects. This is one aspect this study aims at investigating, that is, the influence of water user fee on sustainability of community water projects in Kieni constituency.

A study by Gine and Perez-Foguet (2008) also noted the failure of community projects to generate sufficient revenues meant repairs were not done. They asserted that, communities should chose technologies that are cheaper and efficient and set

tariffs that are commensurate with their economic status and hence affordable. However, Baumann (2006) stated that, the life expectancy of installed water supplies is greatly reduced if there is inability of communities to collect sufficient revenue for repairs. Therefore community water user fee need to be reasonable and take care of repairs and maintenance and other recurrent expenditure. Bannerjee and Morella (2011) suggested that, "an average of 1.9% of household income is spent by rural dwellers on water services in Africa, which is below the commonly cited 3%-5% affordability guideline". This therefore means most Africans do not value importance of water due to their low household expenditure on water. This therefore called for an investigation on water user fee generated, and its influence on sustainability of water projects.

Kleemeier (2000) stated that community members were reluctant to pay when everything appears to be working. Manyena *et al* (2008) found that majority of communities were willing to pay for water services, some did not have the the ability to pay for the real cost of water. Whittington *et al* (2008) observe that, in rural communities cash flows are highly seasonal and have very little savings in rural communities. This, therefore, placed many community water projects in a situation they cannot generate enough of water user fee to cater for operation and maintenance of the established water systems.

Gine and Perez Foguet (2008) emphasized the need for realistic and transparent financing mechanisms in community projects. They noted that, contributions need to be well managed and invested in maintenance and repair for a project to be sustainable. Nedjoh *et al* (2003) argued that inadequate tariffs, lack of knowledge on maintenance costs, and high rates of defaulting by water beneficiaries in addition to poor financial management and ineffective collections influenced negatively the ability of communities projects to be financially sustainable. Wood (1994) on the other hand stated that, for some rural communities, projects with higher technology such as hand pumps represent an unaffordable technology. He suggested more austere rope and buckets as a lower-cost alternative. Such technology could reduce water

tariff costs making water more affordable to Kieni constituents and reduce default payments of water tariffs and increase sustainability of community water projects.

Davis *et al* (1993) raised the question that whether in a community based O & M system, the poor rural communities can meet the full cost of operation and maintenance. WHO (1993) argued that beneficiaries can fully meet maintenance cost. Others argued that because of high poverty levels, meeting full costs of O & M by rural communities is difficult. According to Briscoe and de Ferranti (1998), even in cases where the community members are willing to financially contribute to operation and maintenance of community water projects, they are hampered by lack of resources. McPherson (1994) argued that, there is growing evidence that even the most under privileged segments and poorest of society were willing to pay for water supply as long as it was reliable. UNCHR (1997) argued that, water demand in low and middle income generally, people are willing to pay a higher proportion of their income for improved services than their rich neighbors. In support of this view, Churchill (1998) also argued that some areas in various countries where poverty is extreme, the communities can afford to pay for improved water services, provided that appropriate technology is used. This could be attributed to the fact that people in rural areas are already spending high proportion of their time and energy in water collection. Kieni constituency is an arid area which receives inadequate rainfall yet majority practice agriculture as main source of livelihood. This situation requires investigation on whether the communities are willing to pay for water usage and its influence on sustainability of community water projects.

Water tariffs can be implemented for different reasons under different structures. In most cases water is charged so as to provide revenues to projects for the efficient delivery of water services. According to Brikke and Rojas (2001), the operation and maintenance cost recovery was essential for the financial sustainability of water projects, proper and effective system maintenance, leading to provision of quality water services. According Magnusson (2004) water pricing promoted efficient and sustainable use of water. Whittington (2003) suggested that water pricing promoted fairness and equity in access to water and water use. He emphasized the need for

transparency in pricing of water. Brown and Holcombe (2004) stated that "a consumer, who consumes twice the quantity water, as another consumer, should pay a bill, that is, at least twice as large as that of the latter". However Ruijs *et al* (2008) had a different view that, fairness on pricing of water should be on the basis of affordability and socio-economic characteristics of the household. This is because water is essential for human survival. Therefore fairness in water user fee is essential to prevent negative consequences associated with the lack of access to safe and sufficient water supply and sustainability of community water projects.

Water tariffs can also be used to promote poverty alleviation. This is because the water tariffs will generate revenue for the extension of improved water supply services to the poor with relatively high economic and social returns (World Bank, 1993). The poor usually spend more of their financial resources on medical bills due to the consumption of poor quality water. Thompson *et al* (2001) had documented that improved water sources within households in East Africa and Manila, saves time for water collection and thereby to engage in productive activities which can generate revenue for their households and improve household incomes, and also reduce medical expenses due to improvement in health.

From the analysis of the 20 sub-Saharan African countries poverty reduction strategy papers (PRSPs), 85% of those countries had an emphasis on community management and financing of rural water supplies (Harvey, 2006). However, they did not adequately address the affordability of associated costs of water. This situation need to change for improvement in the levels of sustainability and reduction of proportion of people without access to safe drinking water in rural Africa. The success of cost recovery system, as a determinant of sustainability, is affected by the extent to which water management committees are guided, supported and retrained, in relation to water user fee structures and financial management. If such external guidance is absent, then the success of cost recovery systems and efforts will diminish (Misgina, 2006).

2.8 Sustainability of Community Water Supply Projects

This section covers literature on the concept of sustainability, sustainability of community water projects, and operation and maintenance of water projects.

2.8.1 Concept of Sustainability

The concept of sustainability had been closely linked to environmental science and ecology. According to Chambers (1998), sustainability was defined as the degree to which the natural resources are exploited without damage to the environment. According to Carter and Rwamwanja (2006), the concept was elusive and interpreted in many different ways. The most popular definition of sustainability is drawn from the 1987 report of the United Nation World Commission on Environment and Development which defined sustainability as "meeting the needs of the present without compromising the ability of future generations to meet their own needs". World Bank (2011) defined sustainability as the ability of a project to generate expected benefit through its economic life. WHO (2000) defined sustainability as "ability of a project to continue to function effectively for the foreseeable future, with high treatment coverage, integrated into available health care services, with strong community ownership using resources mobilized by the community and government".

The World Health Organization (WHO) Global water and sanitation assessment report (WHO, 2000) differentiated between functional and environmental sustainability. Abrams (1998) in defining the concept of sustainability of water services refers to a sustainable intervention as one which continues to operate over time. Abrams viewed sustainability of water projects as a "continued flow of water at the same rate and quality as when the supply system was designed". To Abram if water flows, then all elements of sustainability would be in place. Brikke and Davis (1995) also referred to sustainability in rural water supply projects to mean, water projects that are maintained in a condition which ensures an adequate and reliable water supply over a prolonged period of time.

On the other hand, Mukherjee *et al* (2003) described sustainability based on the publication of WSP and IRC (2003) as "the satisfactory functioning and effective use

of services, and equity as everyone, men and women, rich and poor, having equal access to benefits from projects". Schouten *et al.* (2003) on the other hand, defined success of a water project as a system that reliably meets the needs of all the target groups without leaving the poorest un-served. Kinzinger (2010) defined sustainability as capacity to obtain revenues in responding to demand of community, and maintain growth rate that produce results. Kizinger came up with six dimensions of sustainability, that is logistics sustainability – continued maintenance of project facilities and operation; economic sustainability – continued flow of net benefits; Community sustainability – continued community participation; equity sustainability – that is equitable sharing of project results; institutional sustainability- institutional stability; and Environmental sustainability – maintenance of environmental stability. This studies by Kinzinger (2010) did not analyse influence of capital structure and how debt finance could be used in rural projects to raise more funds and boost sustainability efforts.

The International Fund for Agricultural Development (IFAD) Strategic Framework 2007-2010 (IFAD, 2007) gave the definition of sustainability as "ensuring that the institutions supported through projects and the benefits realized are maintained and continue after the end of the project". In order to ensure project sustainability, IFAD considered four dimensions of sustainability namely: Institutional sustainability, that is, creation of a self-sustaining institution after the project implementation ends; community and household resilience that is, communities are able to anticipate and adapt to change through collaboration, clear decision-making processes and management of internal and external resources of the community; environmental sustainability, that is, a project must avoid overexploitation of renewable resources, maintain a stable resource base and preserve biodiversity; and lastly, structural change that is, the dimensions of poverty are handled effectively through empowerment of marginalized rural households and the poor. This documentation by IFAD left out aspects of capital contribution by the community where the project was implemented which was vital for creation of ownership and assuring active participation by the community members.

For the purpose of this study the researcher utilized the more specific, function oriented definition provided by Kimberly (1998), who stated that sustainability in water projects means, ensuring water supply projects continue to operate and they generate expected benefits over time. Kimberly further pointed out that, sustainability is all about ability to maintain initial targeted project service standards. To achieve this, he explained that, sustainability has to be planned from the very conceptualization of the project, in order to come up with strategies that ensure sustainable projects and intervention are initiated.

2.8.2 Sustainability of Community Water Projects

Construction of potable water projects in rural areas is the first step to increase community access and contribute to the health of its members. However, this alone would not achieve all the intended objectives unless sustainability of the water projects is ensured. An African Development Fund (ADF) (2005) report on Ethiopia rural water projects showed that, 33% of rural water projects were non-functional. The report gave reasons such as lack of enough resources for operation and maintenance, inadequate community mobilization and commitment, as well as lack of spare parts. According to Harvey and Reed (2007), the reason for non-sustainability of most water projects in developing countries may include among others; lack of acceptance and non-affordability of community contribution, lack of community ownership and lack of community education. In addition, lack of interest and motivation by management structures like caretakers and project committees also contributes to the high rates of poorly functioning or unsustainable water supply systems. Capital structure and water user fees were not considered as factors that influence water projects sustainability. This was a gap this study aimed at bridging.

A study conducted by Vinya (2003) by the Sarvodaya Shramadana Movement (Sri Lanka), on the water and sanitation projects, indicated that the high level of guaranteed demand and community participation formed the “software” part of the community development project. When combined with the “hardware” such as intensive community training, standardization, and constant close monitoring at various levels, leads to success and sustainability of a community projects. This study

investigated how the "software" that is the community participation through capital contribution, that was equity finance, and payment of water usage fees, influenced the sustainability of the "hardware", that is the community water project.

However, Harvey and Skinner (2002) stated that, sustainability of rural water projects depended on many factors. Some of these factors included legal and institutional framework, policy, community participation, demand for water, community organization; economic and financial factors such as ability to pay for services; technological factors such as availability of spare parts, technology choice, and operation and maintenance and lastly managerial factors. Capital structure was not captured as a factor that influences sustainability which this study investigated.

Lockwood *et al.* (2010) categorized indicators for the post-construction sustainability of rural water projects. The contributing factors were divided into five categories namely: 'financial', 'technical', 'community and social', 'environmental' and 'institutional and policy'. This study also rated these factors in terms of importance for the water project post-construction sustainability. An adequate tariff or water user fee for operational and maintenance costs and monitoring and external follow-up support were the two factors given the highest critical importance. The study further stated that, cost recovery or payment of water user fee in rural water supply project was very problematic in many countries. The observed causes for this problem were high poverty levels similar to the study area Kieni Constituency, lack of regular cash incomes and poor design on tariff structures. A study on water systems in Western Kenya mentioned the poor governance and mismanagement of collected revenues by local water committees as a main cause for the low cost recovery (Tertiary International, 2012). As per the research in the study area, 52% and 69% of respondents noted this as a main reason for not paying water fees in different areas.

A financially sustainable water system was one with ability to recover in full all costs (Cardone & Fonseca, 2003). Water project costs were not only the costs for maintenance and operation but also other cost. Figure 1 gives an overview of all cost components for a sustainable water service. Besides the cost components it gives an

overview of possible sources of funding. For a water service to be financially sustainable, the total costs should match with the total available money, that is, funds from equity finance from community, grants from donors and Government as well as loans from private sector such as banks should be adequate.

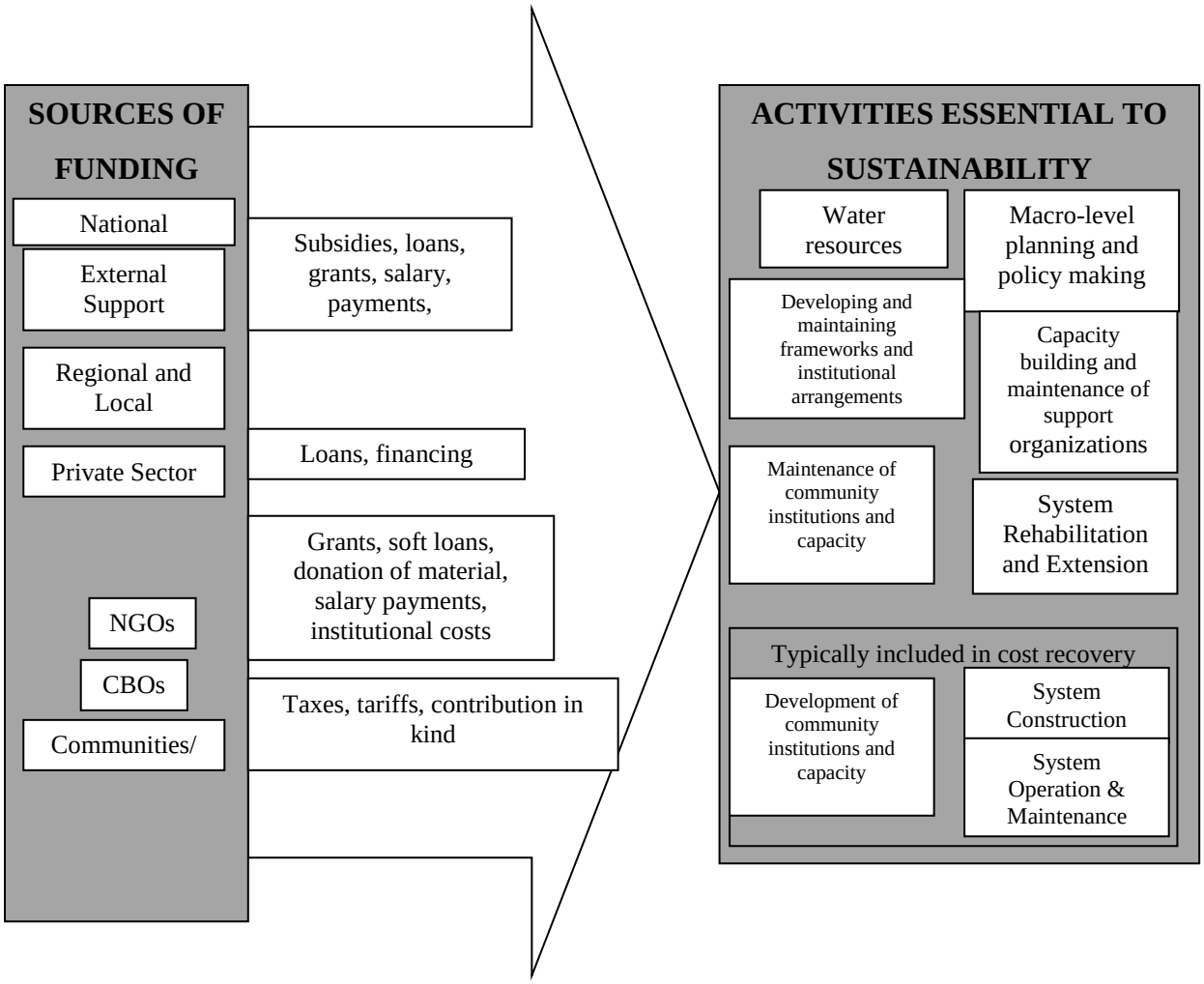


Figure 1: Sustainability and costs related to providing a sustainable service, with available sources of funding (Fonseca, 2003).

Figure 1 shows a breakdown of different sources of funds, that is grant finance, equity finance and water user fees. The National Authorities, external support agencies and NGOs and CBOs are the main sources of grants financing, through subsidies, grants, salary, payments, meeting institutional costs among others. The source of debt finance, such as loans, is the private sector mostly financial institutions, regional and local authorities and some NGOs. The major source of equity finance and water user

fee is the communities who are the water users. These funds from different sources are important in implementing activities essential to sustainability of a water project. Such activities include water system construction, water system operations and maintenance, water resource management, developing and maintaining water framework and institution arrangement, water system support among others. This study aimed at investigating the influence of capital structure which arises from different sources such as subsidies, grants, loans, water tariffs among others, on sustainability of community projects.

More specific principles for sustainable cost recovery are given in the WHO training package for operation and maintenance (O & M) of rural water supply and sanitation systems (Brikke, 2000). The seven key principles can be summarized as clarifying financial responsibilities, identifying the cost and its implications on the project, maximizing the willingness to pay, setting a water user fee structure that is appropriate and equitable, optimizing operation and maintenance costs, developing and maintenance of an effective financial management system, and organizing and maintaining access to alternative and variety of financial sources. This principles were important in coming up with a reasonable water user fee and pricing of water for sustainability of community water projects which this study investigated.

2.8.3 Operation and Maintenance (O&M) and Sustainability of Water projects

World Bank defined operation as the daily management of the project, while maintenance of activities to keep the project system in working condition to generate benefits (Castro *et al*. 2009). More specifically, maintenance was 'the combination of all administrative, technical and managerial actions during the lifecycle of a project restore and retain it to a state in which it can function as required (EFNMS, 2011). Harvey and Reed (2004) distinguished three types of maintenance, namely: - "preventive work which is planned and carried out on a regular basis to maintain and keep the infrastructure in a good condition. Its aim is an early detection of defects and avoidance of breakdowns or deterioration. Within rural communities this form of maintenance is often neglected. In an ideal scenario, active preventive maintenance is the main form of maintenance".

The second one is corrective reactive: this is normally carried out due to infrastructure deterioration or breakdowns. This maintenance is done because the project is not operating as required. Most rural projects focus on this form of maintenance. The third one is rehabilitation, that is, maintenance carried out to correct major defects. It is mostly to restore the water supply project to its original operating status. According to Harvey and Reed (2004), the costs for rehabilitation is far more expensive than both other types, preventive maintenance are lowest while the costs for corrective maintenance are higher than preventive maintenance. The World Bank gives the following three key elements of O & M (World Bank, 2011): An O & M plan including a task schedule with minimum activities, their frequency, the person responsible, the materials and spare parts needed, the tools and equipment needed, and who covers the costs. A policy for financing the O & M activities, and finally training and capacity building for O & M team. These are key ingredients for a sustainable community water project which requires adequate finances. Key among such sources is equity finance, debt finance, grant finance and water user fee charged on consumption of water.

2.9 Management and Sustainability of Community Water Project

Appropriate management capacity and skills are necessary in selecting appropriate capital structure, set appropriate water user fee and to run a water project efficiently. Important skills such as organizing bills, budgeting, recording expenses or revenues collected, monitoring, and applying sanctions. The management capacity of the community project is therefore important in ensuring sustainability of water projects. According to Binder (2008), if community management of rural water supply project lacks ability to maintain operations the project will not be successful. If management cannot generate financing resources projects will not be sustainable (Binder, 2008). Binder also added that, allocating sufficient funding for rural water supply projects is key for sustainability of the projects.

Financial administration in water supply systems covers the maintenance of all documents, records, books and information concerning accounting and financial aspects. A reliable financial records system can greatly improve community

management of water projects. A good record management is necessary to keep accurate accounts about the resources required in provision for water service, make better decisions due to clear and accurate information, control income and expenditure, users who are interested in checking the financial management can get the information, and above all maintains the trust and confidence of community and other key stakeholders.

The provision of water supply cannot be cost free, operation and maintenance costs should be recovered through water user fee for sustainability of the water projects. Such costs include repair and maintenance costs, operation costs and rehabilitation or replacement costs (Briscoe and de Ferranti, 1998). World Bank evaluation report noted that, unless tariffs and water user fee generate enough resources to operate the system, cater for expansion of new water customers and be able to finance replace the water project infrastructure after its useful life sustainability cannot be ensured (Paraguay ICR, 1999). Community water management has the responsibility of setting a reasonable water user fee and creates systems for collections and accountability for the funds raised from water sales. Without such systems operations and maintenance will not be possible hence leading to lack of sustainability of community water projects.

A common feature in most rural water projects is the lack of regulation on financial management. Most community water projects are managed by water committees who are democratically elected representatives of the communities (Wood, 1994). According to Schouten and Moriarty (2004) community management means that a community transfer full responsibility of managing water projects tasks to the committee. These tasks delegated included collecting payment, setting tariffs and carrying out routine maintenance, as well as decisions making on the water projects.

According to Harpe (2000) community want water projects that are sustainable, where all stakeholders, including the vulnerable, are involved in decision making and where cost of water is equitable and fair. This means good governance is required in management of water projects. Good governance involves constructive cooperation

between the community, water management, funders and other important stakeholders. This cooperation combined with efficient use of resources, effective and sustainable service provision, transparency and accountability, and responsible use of power bring about proper management which ultimately leads to sustainability of water projects. Harpe (2000) identified eight main elements that organizations must accede to in order to achieve good governance; participation, transparency, equity, inclusiveness, fairness, responsiveness, consensus orientation, efficiency and effectiveness and accountability.

.

Kafakoma and Silungwe (2003) further submitted that for a water project to be sustainable, a well-structured communication network was required to ensure that water beneficiaries were kept informed on matters affecting the project. Important information to be communicated by water management included changes in government policies on water, changes in prices for materials and equipment, cautions on epidemiological concerns for example cholera, reinforcing health messages, and upcoming important meetings. A comparative evaluation of community managed water projects by Elshorst and O'Leary (2005), revealed that, when community were involved in planning decisions had better and sustained water services.

2.10 Government Policy and Sustainability of Water Projects

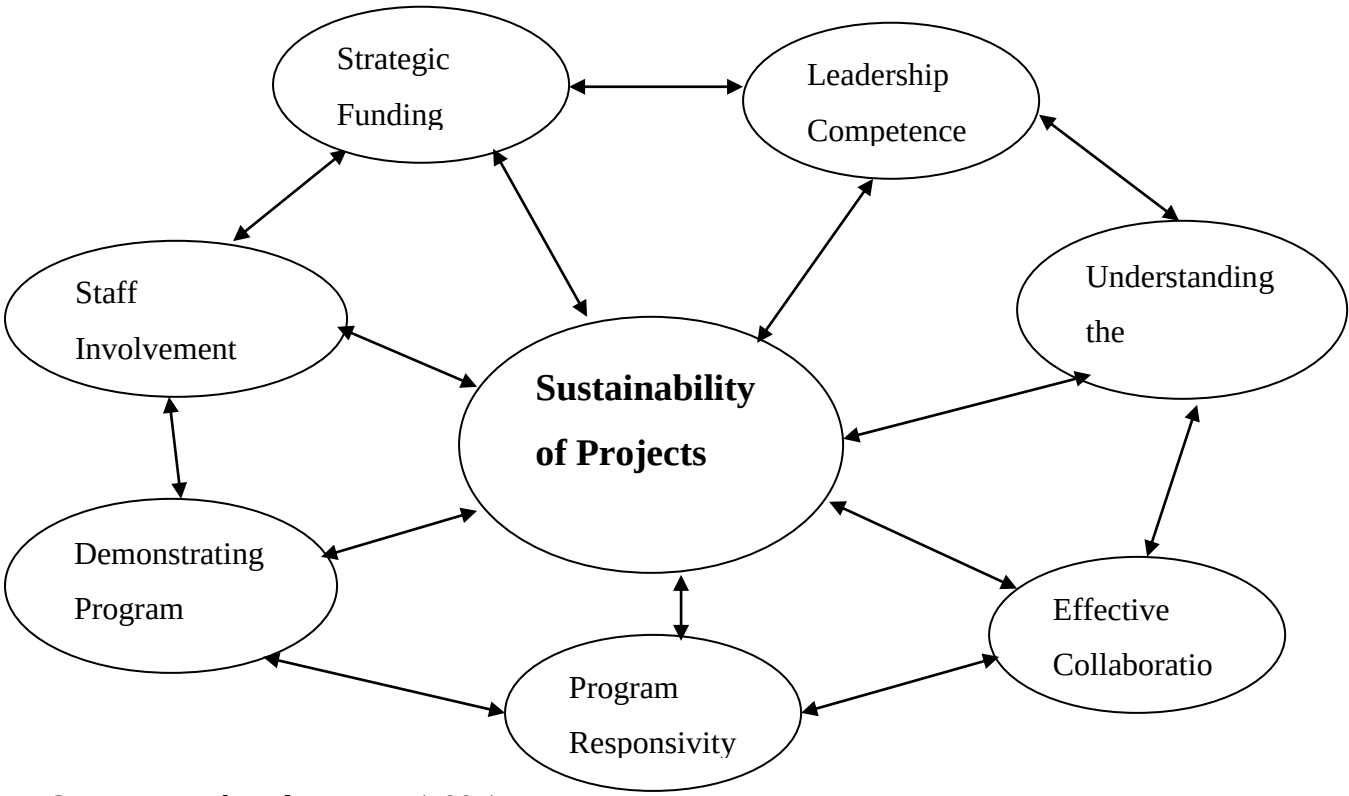
Community enthusiasm and participation in water projects, effective collection of revenue for recurrent expenses, can negatively wane within two or three years after construction if Government policy is not conducive (Postnote,2002; and Antonio, 2005). Government has a responsibility of ensuring sustainability of water projects. Government support should be inform of institutional support and policy arrangements that support community management in ensuring that community water services are sustainable. Harvey and Skinner (2002) observed that, sustainability of rural water supply projects depended on many factors. These factors include government policy, legal and institutional framework, among other factors. The legal framework and water policies are initiated by Governments.

2.11 Theoretical Framework

This section covers model of sustainability and theories of capital structure.

2.11.1 Sustainability Model

According to the model by Marek and Mancini (2007), elements that lead to sustainability included leadership competence, effective collaboration, understanding the community, demonstrated program results, strategic funding, staff involvement and integration, and program responsivity as shown in Figure 2.



Source: Marek and Mancini (2005)

Figure 2: Sustainability Model

A sustained project, according to Marek and Mancini (2007), means a project continues to deliver the intended benefits to the intended target group over the long term consonant and in line with program goals and objectives. The model proposes seven important elements for sustainability. One of them is strategic funding. This involves coming up with tangible plans for resources mobilization and to secure

funding, for present and future programming and ongoing projects. Marek and Mancini noted that this is the most important element for sustainability. This study focused on the extent to which different sources of funds influence sustainability of a community water project. Funds for a community project can be acquired through equity financing where communities give their own resources; debt finance, that is loans from financial institutions; grant financing from donors; and water user fees, which is charges for using water by consumers. To establish the most appropriate capital structure or the ideal mix of different sources of funds has a direct influence on sustainability of community water projects. This study established the extent to which these different sources of funds influence sustainability of community water projects.

All the remaining six elements of sustainability were aspects of management which was the mediating variable of the study. According to Marek and Mancini (2007), leadership competence influence sustainability since, leaders establish goals; develop clear and realistic plans regarding development, implementation, and evaluation. On effective collaboration, stakeholders who support project goals and understand the project, have clear roles, and who actively participate in the project lead to sustainability of the project. Understanding the Community mean project implementers respect community culture, norms, belief and values, respects members for whom they are, have knowledge on community needs and assets, and ensure community actively participate in meeting project goals and objectives. Another element was demonstrating project results. Project management must communicate achieved milestones over time. This increases support and positive image from stakeholders.

The evaluation of project process and outcomes by management with acceptable methods and informing stakeholders of results are also important ingredients for sustainability of projects. Staff involvement and integration means, management should ensure staffs are committed to program goals, involved in important program decisions and activities. Program responsivity meant the ability of the project to adapt to changing community needs.

This model highlighted key variables that informed this study. The importance of strategic funding informed the independent variables, which were equity financing, grant financing, debt financing and water user fee, as well as the intervening variable which was management and the dependent variable which was sustainability of community water projects.

2.11.2 Theories of Capital Structure

This section covers theories underpinning the study. The theories include prospect theory, pecking order theory and trade off theory.

Prospect Theory

The proponent of this theory was Daniel Khneman and Amos Tversky in 1979 proposed accurate psychological description of preferences of alternative sources of funds compared to expected utility theory. This theory is a behavioral economic theory that describes how management makes decisions between alternatives that involve risk. According to the theory, individuals make decisions based on the potential value of gains and losses rather than the final outcome. The model is descriptive in nature and it explains real-life choices, rather than optimal decisions to be made (Esterlin, 1974).

In a water project, stakeholders consider the risk of taking loans in terms of interest rates expected to be paid to the financier as a loss due to decreasing liquidity of the project, which therefore, decreases the possibility of going for debt finance. This could affect ability of the water project to meet its short term obligations, such as, conducting repairs and maintenance of the water project infrastructure. On the other hand, grants from the government and donors come with no costs or 'loss' hence increasing the prospects of depending on grants as compared to debt financing. However, effects of free funds may cause the project to be tied to the donor and may lead to implementation of projects that are not priority and the recipient communities could have little to say in the project. Grants could also have a negative effects management of community water project productivity by impairing their competitiveness. Free funds could affect the community's motivation to monitor

effectively water projects since they believe "it is not their money" that have been used in the project leading to negative effects such as neglect and lack of active participation on water projects issues thereby affecting sustainability of community water projects negatively.

Therefore, community water project committees could be deciding their capital structure based on potential losses and gains. Such losses could be payments of high interest rate to financial institutions and gains could be the benefits of grant finance which are normally free.

Pecking Order Theory

The pecking order theory was first suggested by Donaldon in 1961 and it was modified by Stewaret C. Myers and Nicolas Mjaluf in 1984. It stated that, firms prioritize their sources of funding, from internal sources of finance to equity to debt, according to the tenet of least resistance least or least effort. Therefore, most companies will prefer to raise equity as a last resort financing option due to the complexity in raising equity finance. As a result, company utilize internal funds first, and when the internal sources are depleted, debt is raised, and when it is not practical to issue more debt finance, equity finance is issued (Myers, 2001). For a community water project it is easier to raise grants especially from the government as compared to debt finance which requires more efforts to raise since banks require collateral plus other requirements which are normally stringent.

Pecking order theory application starts with a situation where the firm has asymmetric information and managers are more informed about the companies' risks, prospects and value than outside investors. The choice between external and internal financing and between the issue of equity or debt is influenced by the asymmetric information available to management. For a community water project, this theory justifies the use of Government grants which are easily accessible and equity which is mostly in terms of provision of labour by the beneficiaries. Debt finance requires greater effort to raise and resistance falls down in the order of preference. Therefore, there exists a pecking order for the financing of community water projects.

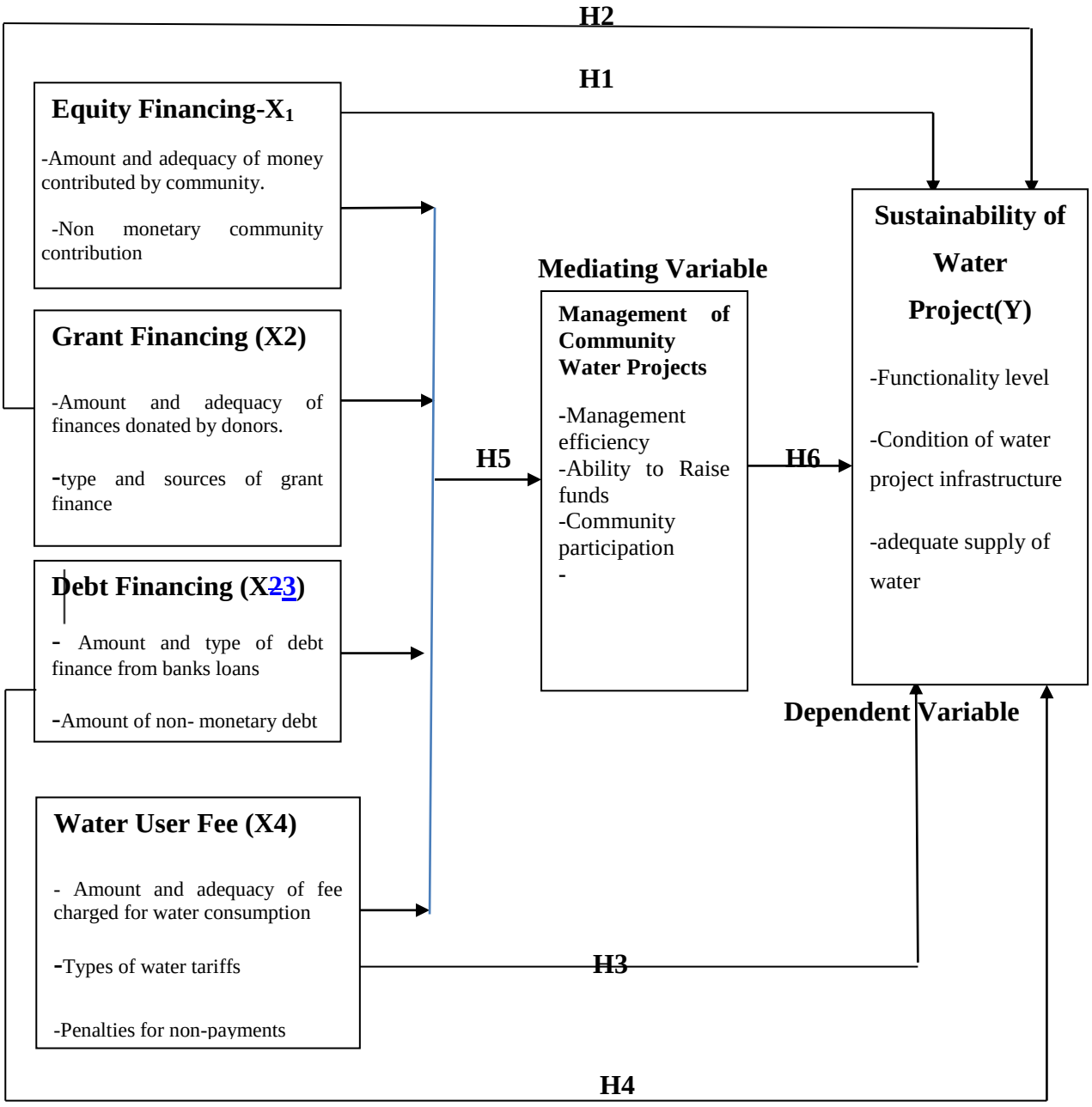
Trade-off Theory of Capital Structure

The trade-off theory of capital structure refers to the idea that a company chooses how much equity finance and how much debt finance to use by balancing the benefits and costs (Souku, 2008). The proponents of this hypothesis were Kraus and Litzenberger (1973). They considered a balance between the tax saving benefits of debt and the dead-weight costs of bankruptcy as a result of debt financing.

The theory explains that companies are financed partly with equity and partly with debt. It asserts that, there are advantages of debt financing, that is, there is tax benefit where firms are taxed after interest have been deducted. However, the cost of debt financing, is financial distress due to payment of interest which takes away working capital which affects ability of a firm to meet its short term liability thereby increasing chances of illiquidity and bankruptcy (Souku, 2008). The marginal benefit of debt financing reduces with increasing debt, since the marginal cost of debt increases. Hence, a firm that is optimizing its overall value will focus on this trade-off between debt and equity to use for financing (Souku, 2008). This theory is often set up as a replacement theory of the pecking order theory which prioritizes sources of funding according to least efforts required in raising them. This study will aim at establishing an ideal mix of debt, equity and grants that will result to sustainable water projects. For a community water project, project managers may choose the type of finance based on trading the costs and benefits of each finance. For instance, choice of equity financing comes with no nominal cost since community members only focus of getting water as opposed to debt financing which will require repayment of the principal amount and interest. Grant financing too, carry no nominal cost since there is no obligation to pay or requirement for repayment. Therefore based on trade of theory, community water project managers may opt for equity financing and grant financing as opposed to debt financing as an ideal situation.

2.12 Conceptual Framework

This section covers an illustration of the relationships between independent variables, mediating variable, intervening variable and dependent variable.



Independent Variables

Figure 3: conceptual Framework of capital structure and sustainability of community water projects.

From Figure 3, independent variable equity financing (X_1) influences sustainability of community water project. This is shown by:-

H_{01}. Hypothesis one which this study aimed at testing, that is, there was no significant relationship between equity financing and sustainability of the community water projects, which was expressed as a model as: $\boldsymbol{Y_1=\alpha_{01}+\alpha_{11}X_1+e_1}$

H_{02} shows the relationship between debt financing and sustainability of community water projects, which was expressed as a model as:-$\boldsymbol{Y_2=\alpha_{02}+\alpha_{12}X_{2+}\ e_2}$

H_{03} shows the relationship between grant financing and sustainability of community water projects, which was expressed as a model as:-$\boldsymbol{Y_3=\alpha_{03}+\alpha_{13}X_3+e_3}$

H_{04} shows the relationship between water user fees and sustainability of community water projects, which was expressed as a model as:-$\boldsymbol{Y_4=\alpha_{04}+\alpha_{14}X_4+e_4}$

H_{05} shows the influence of capital structure X_5, (that is, the combined effect of equity financing, debt financing, grant financing and water user fee); on sustainability of community water projects.

Hypothesis five which this study aimed at testing, that is, there was no significant difference between capital structure and sustainability of the community water projects. This was expressed as a model as: $\boldsymbol{Y_5=\alpha_{05}+\alpha_{15}X_{5\ +}e_5}$

H_{06} there is no significant intervening effect of management on the relationship between capital structure and sustainability of community water project. This was expressed as model as: $\boldsymbol{Y_6=\alpha_{06}+\alpha_{16}X_{5+}\alpha_{26}X_{6+}e_6}$

2.13 Knowledge Gaps

Table 2.1 Knowledge Gaps

Purpose and Objective	Variable	Author	Focus/ Empirical Literature	Knowledge and Methodological Gaps
The purpose of the study was to investigate influence of capital structure on sustainability of community water projects in Kieni Constituency, Nyeri County.	1.Sustainability of community water projects (Dependent variable)	Musonde, K. (2004).	The study was on issues regarding sustainability of rural water supply in Zambia The study noted that, in order to achieve sustainability of WSFs, there is need to ensure that (1) there is an effective community organisation; (2) communities have the ability to operate and maintain WSFs; (3) communities are able to raise adequate user fees for purchasing spare parts; and (4) that there is a strong backup support at the district level to carry out major repairs. Major threats to the sustainability of WSFs include high poverty levels in communities, weak institutional framework and inability of communities to handle major breakdowns.	My study focused on capital structure which this study by Musonde did not cover. Musonda (2004) relied on twenty-four interviews which were conducted: 16 from rural communities and 8 from water supply agencies. This therefore indicated that the finding could not be generalized since the sample size was too small and not selected randomly. This study randomized the sampling hence generalization is possible.
		Abrams (1998); Well, (1998); Mukherjee & Van Wijk (2002)	These studies identified eight factors that were critical to achieving sustainability of rural water supplies: Policy context; institutional arrangements; financial and economic issues; community and social aspects; Technology and the natural environment; Spare parts supply; Maintenance systems; and Monitoring.	All these studies did not focus on capital structure as a factor that influenced sustainability of water projects. This study sought to bridge this gap by focusing on capital structure.

1. Establish the extent to which equity financing influences sustainability community of water projects in Kieni Constituency.	Equity Financing	Harvey & Reed (2007	The study found out that, the reasons for non-sustainability of most water projects in developing countries included lack of community contribution, lack of community ownership and lack of community education.	The study did not assess the extent to which community contribution influence sustainability of community water projects. This study bridged this gap.
2. Assess the extent to which grant financing influence sustainability of community water projects in Kieni Constituency.	Grant financing	Miller (2002)	The study found out that, despite grants being free money and major source of water infrastructure development money, aid or grants may be project tied and may lead to implementation of projects that are not priority projects especially if the recipient government or communities have little to say in their choice. In addition, grants comes with conditionality which may adversely affect projects leading to lack of sustainability.	This study by Miller was broad and did not assess the extent to which grants affect sustainability of community water projects. This study assessed the extent to which grants affect sustainability of community water projects.
		Adam & Bevan (2006) and Nkusu (2004)	These two studies found out that, large inflows of foreign aid to country that results in lack of sustainability of development projects. The noted that, foreign aid in terms of grants have a negative effects communities' productivity by impairing their competitiveness. The argument was that, grant restrain progress of the community and undermine growth of the recipient of the aid	These two studies were also broad and did not assess how grants affect community water projects. It focused on all development projects in developing countries. This study was specific to community water projects only.

3. Examine the extent to which debt financing influences sustainability of community water projects in Kieni Constituency.	Debt financing	Modigliani & Miller, (1963)	This study found out that, debt financing gives rise to tax shelter to a venture. It asserted that, debt financing enhances company value. However, debt makes a company lose flexibility. Loss of flexibility can erode shareholders value.	This study focused on debt financing on profit making organizations and did not cover non-profit making organizations such as community water projects.
		Thomas & Wienhold (1982)	Thomas E. Piper and Wolf A. Weinhold noted that, debt financing brings about liquidity constraints due to fear of violating debt covenants will usually trim strategic expenditures, and investment opportunities therefore affecting performance of entities.	This study did not capture effect of debt financing on non profit making organizations such as community water project. This study bridged this gap.

4. Establish the influence of the water user fees on sustainability of community water projects in Kieni Constituency.	Water user fee	Shaw (2012)	This study assessed sustainability of rural water supply in Monze District, Zambia, and found out that, communities were not collecting sufficient funds to pay for repairs and maintenance since without sufficient funds, spare parts could not be purchased, therefore affecting sustainability.	In Shaw (2012), the study design was a case study and the main data collecting method was a semi structured interview. This therefore gave limited room for generalization of the findings. In addition, this study did not show the extent to which water user fee influenced sustainability of community water. This study bridged this gap.
		Adida (2012)	In his study on financial sustainability of rural water supply in Western Kenya, found out that, the communities were not able to collect enough money to keep the water systems functioning. The water systems he focused on were hand pumps and motorized pumps.	Adida (2012) did not focus on capital structure of the water projects but on financial management of the hand pumps and motorized pump, which is a small aspect in community water projects. It also did not focus on gravity water projects. The study also did not focus on how the initial construction resources were contributed and how they influence sustainability of community water projects.
5. Investigate influence of capital structure on	Capital structure	Siro (2013), Murakaru	These studies focused on influence of capital structure on financial performance of listed firms	None of these studies looked at influence of capital structure on

sustainability of community water projects in Kieni Constituency.		(2013) and Otieno (2012) Kamau (2010) Orua (2009)	in securities exchange in Kenya. The studies found a strong relationship between capital structure and financial performance of listed firms. Siro noted that, there was an inverse relationship between capital structure and financial performance of listed firms in securities exchange in Kenya. Otieno, found out that, there was weak relationship between capital structure and performance at NSE. Kamau assessed the relationship between capital structure and financial performance of insurance companies. It found out that, there was a positive but weak relationship between capital structure and financial performance. Orua, on the relationship between capital structure and financial performance of Microfinance institutions (MFI) in Kenya among others, revealed varied relationships between capital structure and performance.	sustainability of community water projects which are non profit in nature. This was a gap that this stud aimed at bridging.
6. Explore the extent to which management intervened the relationship between capital structure and sustainability of community water projects in Kieni Constituency.	Management of community water projects	Harvey & Reed (2007)	This study found out that, the reasons for non-sustainability of most water projects in developing countries may include among others lack of interest and motivation by management structures like caretakers and project committees.	The extent to which management influence relationship between capital structure and sustainability was not covered.
.		Beyene (2012)	This study was on factors affecting the sustainability of rural water supply systems: the case of MechaWoreda, Amhara region, Ethiopia,	The study by Beyene (2012), in its methodology, the study relied on expert point of view in this study. Community were

		in MechaWoreda only one of the 21 systems installed without community support was still functioning while only 12 of the 142 systems installed with community failed. One of the reasons of abandonment of dug wells despite full participation initially during planning and construction was the institutional support of the water supply systems after construction was very weak mainly due to understaffing of the Woreda office and lack of proper maintenance of the initiated water projects.	represented in focus group discussions, therefore the extent to which the result can be generalized was limited. The findings of this study can be generalized.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter covers the research design chosen for the study. It outlines the target population, sampling procedure as well as the data collection methods to be employed. It explains how validity and reliability of research instruments was ensured and the data analysis methods that the study used and an operational definition of variables table as well as ethical issues considered in this study.

3.2 Philosophical Foundation of the Research

A research philosophy is a belief about the way in which a phenomenon should be analysed using data that is gathered, analysed and interpretation used. This research was philosophically and methodologically guided by realism in investigating influence of capital structure on sustainability of community water projects. This philosophy resulted from inadequacies of positivism was over-deterministic with little room for choice and constructivism which was highly contextual. Realism takes some aspects from positivist and interpretivist positions. This philosophy holds that real structures such as sustainability of projects and capital structure of projects, exist independent of human consciousness, but that knowledge is socially created, with Lewis Thornhill and Saunders (2007) contending that our knowledge of reality is a result of social conditioning. Accordingly in this study realism is concerned with knowledge of reality of things. Such knowledge could be factors such as equity, debt, grants, water user fees, and how these things behave to influence sustainability of community water projects, it contends that reality exist in spite of science or observation, and there is validity in recognizing realities that are simply claimed to exist or act, whether proven or not.

From an organizational perspective, Hatch and Cunliffe (2006) describe a realist researcher as a person enquiring into the mechanisms and structures that underlie institutional forms and practices such as choice of capital structure for this study, how they might empower and constrain functioning of a project such as water projects, and

how such forms and states may be critiqued and changed. Realists take the view that research is done from different angles and at multiple levels contribute to better understanding of phenomena since reality can exist on multiple levels (Chia, 2002)..

Therefore, this study adopted a mixed mode approach that is both qualitative and quantitative. Interviews and open ended questions in the questionnaire generated qualitative data while close ended questions in the questionnaire and observation schedule generated quantitative data. This study got data from multiple sources regarding influence of capital structure on sustainability of water projects such as beneficiaries of the water projects, water management committee, local bank managers and districts water officers in order to answer research questions, test hypothesis and come up with conclusions and recommendations based on their opinions.

3.3 Research Design

Based on the study philosophy, this study adopted a cross-sectional descriptive survey design. Zickmund (2003) noted that surveys provide quick and accurate means of assessing information. According to Fraenkel and Wallen (2000), this design enables the researcher to collect information from a group of people in order to describe some aspects or characteristics such as abilities, opinions, attitudes, beliefs and/or knowledge of the population which the group is a part. This design was justified because the water projects involved in the study were widely geographically distributed across Kieni Constituency and therefore, the design helped study in coming up with findings about the population by studying a representative of the population. A descriptive survey also attempts to quantify social phenomena (Creswell, 2009). Creswell (2009) added that, using survey design one can test relationships between the independent and the dependent variables. In this study therefore, one can establish relationship between independent variables, such as, debt financing, equity financing, grants financing and water user fee, and the dependent variable, sustainability of community water projects using this design. According to Gay, Mills and Airasian (2006), descriptive survey design describes the way things are and takes both qualitative and quantitative approaches. This design therefore,

enabled the researcher the opportunity to establish the relationship between capital structure and sustainability of community water project and give an opportunity for modeling using quantitative data from questionnaires and observation schedule as well as qualitative data from interviews and questionnaires.

3.4 Target Population

The population of the study comprised of all 73 community water projects and all the beneficiaries of the water projects in Kieni constituency. The distribution of the 3 types of water sources in both Kieni East and Kieni West district is shown in Table 3.1. The chairpersons of the community water projects and 51,304 beneficiaries' households, two District Water Officers from Kieni East and West and 9 Nyeri branch bank managers formed the study population.

Table 3.1 Target Population

Location	Type of Water Project			Beneficiaries
	Gravity fed water systems	Boreholes	Dams & Pans	Number of Households
Gakawa	9	1	2	8097
Kiamathaga	5	1	-	3356
Naromoru	4	2	2	6620
Kabaru	9	1	1	6205
Thegu	4	2	2	4734
Mugunda	4	2	1	3444
Gatarakwa	7	-	1	5518
Mwiyogo	2	2	1	3237
Endarasha	1	-	1	4833
Mweiga	3	2	1	5260
Total	48	13	12	51,304

Source: National Arid Lands Authority (2012)

3.5 Sampling Design

The study adopted both probabilistic and non-probabilistic sampling designs. Probabilistic design included census and stratified random sampling while non-probabilistic design was purposive sampling.

3.5.1 Sampling Technique

A census of all the projects' chairpersons was conducted resulting to 73 respondents as shown in Table 3.2. In addition, stratified random sampling was used to select beneficiaries of the water projects. In cases where population is heterogeneous, it is advantageous to sample each sub-population or stratum independently (Kothari, 2004). According to Fraenkel and Wallen (2000), stratified random sampling is the process in which certain subgroups elements are selected to be in the sample in the same proportion as they exist in the population. Each location formed a stratum which gave respondents according to the corresponding number of households. Based on Krejcie and Morgan (1970) table, from a population of around 50,000, a sample of 382 is adequate (see appendix 8). The distribution of the sample per location is shown in Table 3.3. The response rate of beneficiaries is shown in Table 4.2.

Non-probabilistic method used was purposive sampling. Zickmund (2003) noted that, purposive sampling is used when information is held by a particular person due to experience, authority or skills and expertise as judged by the conventional knowledge. The bank managers of all banks in Nyeri Town were selected purposively because they had information about financing products in their respective banks especially on debt financing. Purposive sampling was also used to select two District Water Officers (DWO) from Kieni West and Kieni East. The DWOs were selected since they were the key Government employees that implemented water policies and laws on behalf of the Government. They were also the technical people regarding water projects. They were expected to give information on sustainability of water projects, equity financing, debt financing, grant financing and water user fee.

3.5.2 Sample Size

The sample size for the study was 382 community water beneficiaries as shown in Table 3.3, 73 community water project chairmen as shown in Table 3.2, two district water officers and 9 bank managers. Total sample size was 466 respondents.

Table 3.2 Sample Size of Water Project Chairpersons

Category	*Target Population*	Number of Officials
Gravity fed piped water projects	48	48
Boreholes	13	13
Dams and water pans	12	12
Total	73	73

Table 3.3 shows distribution of community water beneficiaries' households per location with corresponding sample sizes, in both Kieni East Sub County and Kieni West Sub County.

Table 3.3 Sample size of Water Project Beneficiaries

	Beneficiaries	*Sample*
Location	**Number of Households**	
Gakawa	8097	60
Kiamathaga	3356	25
Naromoru	6620	49
Kabaru	6205	46
Thegu	4734	35
Mugunda	3444	26
Gatarakwa	5518	41
Mwiyogo	3237	24
Endarasha	4833	37
Mweiga	5260	39
Total	**51304**	**382**

3.6 Data Collection Methods

Data was collected by use of self-administered questionnaires, observation schedule and interview schedules. The questionnaires were based on the objectives of the study and had both open and closed form of questions. The choice of this method of data collection was selected because questionnaires can reach a large group of respondents within a short time and with little cost, at the same time use of questionnaires enabled the water projects chairpersons and beneficiaries to remain anonymous and be honest in their responses (Kasomo, 2007). According to Creswell and Clark (2011) one can collect more extensive data in qualitative form as well as qualitative form.

The interview schedules were used to collect data from District Water Officers and bank managers. Interview schedules were used in gathering information from the district water officers on technical aspects of community water project expert. Interview schedule was used to collect information from bank managers on availability of debt finance for community water projects.

Observation schedule helped in gathering data on the state of community water project infrastructure and functionality of the community water projects infrastructure which will be an indicator of sustainability of community water project. The observation tool was used by the researcher and a water engineer from Ministry of Water to assess functionality of water project infrastructure.

3.7.1 Pilot Study

A pilot study was carried out to test the data collecting instruments in Laikipia East District. Laikipia East district had similar climatic and geographical characteristics, as well as demographic characteristics to Kieni constituency. Five community water projects were identified and their beneficiaries for the pilot study. Three bank managers in Nanyuki town were also randomly selected and Laikipia East District water officer for the purpose of testing reliability of the Bank managers' and District water officer's interview guides. Cooper and Schnideer (2008) identified benefits of pretesting of research instruments which included to identifying questions with content, wording and sequence problems with a view of improvement. The pilot study results improved the data collection tools.

3.7.2 Validity of Instruments

Validity is the degree to which a test measures what it purport to measure (Borg & Gall, 1989). Validity of instrument includes content validation, criterion validation, face and construct validation. To enhance content, construct, face and criterion validity, the researcher consulted the experts in the field of research and more so the supervisors. This helped to ensure that the research tools' content was comprehensive and adequate to measure what it was supposed to measure for the purpose of this study. Peer to peer review was also used to enhance the content validity and face

validity. Aspects of face validity included validation of the format of the instruments, that is, clarity of printing, size type and adequacy of work space (Fraenkel & Wallen, 2000). All this was ascertained and all the tools deemed valid in collecting data for the purpose of this study.

3.7.3 Reliability of Instruments

Reliability of the instrument was enhanced through a pilot test, which used the test retest method. The test retest method was preferred because it was simple and effective (Wrench, Maddox, Richmond, & McCroskey (2009) and Carmines & Zeller, 1979). This method involved administering the questionnaires twice to the same group after a certain time interval has elapsed since the previous test (Coopers & Schindler, 2003). During the pilot testing, 5 community water projects' chairmen and 4 water beneficiaries from each water project were used to test reliability of the questionnaires.

A two weeks' time elapsed between the first and the second administration of the questionnaires and the interview guides during testing for reliability of the research instruments. Reliability coefficient of the research instruments were tested using Cronbach's (Alpha) Reliability Coefficients. Cronbach's Alpha Reliability Coefficients range between zero and one. A zero coefficient implies the tool has no internal consistency while that of 1 implies complete internal consistency. According to Creswell (1994), a reliable research instrument should have a composite Cronbach Alpha Reliability Coefficient of at least 0.7 for all items under study. Where the coefficient was less than 0.7, the research questions were revised before going for field work to acceptable levels. In the pilot test, the composite Cronbach Alpha Reliability Coefficient for the research instrument was 0.7832 for chairpersons' questionnaire which was the main tool for analysis. This indicated that the tools were reliable.

For the interview guides for the District Water Officers and bank managers, the response between the first test and the second test were compared. Where there was disparity in response, the questions were amended accordingly to ensure stability of interpretation of the questions by respondents.

Reliability of the observation schedule was 1. There was no difference between what was observed in the first test and the second test and the tool was deemed reliable.

Table 3.4: Reliability Coefficients

Variables	Corrected Item-Total Correlation	Cronbach's Alpha
Equity Financing		
Cash Contribution	0.826	0.769
Labour Contribution	0.628	0.836
Adequacy for Equity Financing	0.836	0.785
Grant Financing	0.763	0.780
Ministry of Water Funds		
Adequacy of MOW funds	0.740	0.768
Debt Financing	0.836	0.785
Loans Acquisition		
Accessibility of Loans	0.638	0.784
Adequacy of Loans	0.592	0.764
Water User Fees	0.567	0.780
Charges for Water Connection		
Monthly Charges for Water Use	0.609	0.782
Pay as You Fetch	0.635	0.785
Adequacy for water User fees	0.631	0.781
Composite Cronbach's (alpha) reliability coefficient		0.7832

3.7.4 Data Collection Procedure

The researcher prepared the data collection instruments and conducted a preliminary visit to the study area. Two research assistants who assisted the researcher to administer questionnaires were recruited and trained by the researcher on their roles and data collection procedure before data collection. The water engineer from Kieni West was also taken through the observation tool, aim and the purpose.

Then the questionnaires both for chairpersons and beneficiaries were administered through personal visit by the researcher and the research assistants on appointment with community water chairpersons and respective area chiefs. For beneficiaries, research assistants were deployed in each locations from different directions where they took a transect walk selecting households randomly and administering the questionnaires to the household head.

The observation of water project infrastructure was done by the researcher assisted by the identified water engineer to observe all the community water infrastructure projects location after location. The observation schedule collected data on state of pumps, pipes, tanks, taps among other facilities. Interviews with the bank managers and DWOs were conducted upon confirmation of appointment, at their place of choice in the month of February 2015.

3.8 Method of Data Analysis

The collected raw data was edited for accuracy, usefulness and completeness. Quantitative data was coded and fed to Statistical Package for Social Science version 20.0. All questions that generated quantitative data was coded and its measurement defined using SPSS program. Test for statistical assumptions namely, test for normality, multicollinearity, homoscedasticity and heteroscedasticity were carried out. Then data was analyzed by use of descriptive statistics namely mean scores, standard deviation, coefficient of variation, range, percentages and frequency distribution. To establish the nature and magnitude of the relationships between independent variables, that is equity financing, grant financing, debt financing and water user fee, and the dependent variable, that is, sustainability of community water project, the researcher used inferential statistics.

Pearson's Product Moment Correlation Coefficient (r) was used to ascertain the degree of association between the independent variables: equity financing, grant financing, debt financing, water user fee and capital structure, on sustainability of community water projects which was the dependent variable. According to Glinner and Morgan (2002), Pearson's Product Moment Correlation helps in calculation of

correlation coefficient which ascertains the strength and direction of the relationships between independent and dependent variables. Correlation coefficient less than 0.3 depicting weak relationship; between 0.31 to 0.07 depicting modest relationship and above 0.71 strong relationships between variables (Glinner & Morgan, 2002). F-statistics (ANOVA) was used for hypotheses testing. ANOVA is a method of choice when testing for the difference between multiple groups and it assumes that the mean is a valid estimate of center and that the distribution of the test variable is reasonably normal and similar in all groups (Field, 2000). The confidence level selected was 90 percent. According to Mense (2011), 90% level of confidence is adequate for interpreting hypothesis results in a social study. The study therefore used α=0.10 as the significant level.

Multiple linear regression analysis was used for modeling of mathematical equation that depicted influence of each independent variable on the dependent variable as shown in Table 3.4. Multiple linear regression analysis seeks to study the effects and the magnitude of the effects of more than one independent variable (Kerlinger & Lee, 2000). It leads to the derivation of an equation in which each independent (predictor) variable has its own coefficient and the dependent (outcome) variable is predicted from combination of all the variables multiplied by their corresponding coefficients plus a residual term (Field, 2000). Information from the analyzed data was presented using tables.

Qualitative data from open ended questions, observations and interviews was analyzed by organizing the data into themes and sub themes as per the research objectives and description given in form of common themes. The data from open ended questions in the questionnaires and the interviews were categorized based on the study variables which were equity financing, debt financing, grant financing and water user fee as well as sustainability of community water projects and management of water projects. Content analysis was also used to enrich qualitative data analysis, where word describing study variables or phenomena were analysed. The analysed qualitative data helped the researcher draw conclusions when combined with the analysed quantitative data.

Table 3.5 Study Hypothesis and Analytical Model

Hypothesis Statement	**Hypothesis Testing At α=0.10 (90%)**	**Regression Model**
H1 there is no significant relationship between equity financing and sustainability of CWP.	$H_{0\alpha} = 0$ $H_{1\alpha} \neq 0$ -F-test (ANOVA)	$\boldsymbol{Y_1=\alpha_{01}+\alpha_{11}X_1+ e_1}$ Where Y_1 is sustainability of community water projects. X_1, -represent equity financing $\boldsymbol{\alpha_{01}}$ is autonomous sustainability or independent of equity financing. $\boldsymbol{\alpha_{11}}$represent coefficients of equity financing e – error term, random variation due to other unmeasured factors.
H2 there is no significant relationship between debt financing and sustainability of CWP	"	$\mathbf{Y_2=\alpha_{02}+ \alpha_{12}X_2+ e_2}$ Where Y_2 is sustainability of community water projects. X_2, -represent debt financing α_{01} is autonomous sustainability or sustainability independent of debt financing. α_{12} represent coefficients of debt financing e – error term, random variation due to other unmeasured factors.
H3 there is no significant relationship between grant financing and sustainability of CWP	‘’	$\mathbf{Y_3=\alpha_{03}+ \alpha_{13}X_3+ e_3}$ Where Y_3 is sustainability of community water projects. X_3, -represent grant financing α_{03} is autonomous sustainability or sustainability independent of grant financing. α_{12} represent coefficients of grant financing e – error term, random variation due to other

H4 there is no significant relationship between water user fee and sustainability of CWP	"	unmeasured factors $\mathbf{Y_4=\alpha_{04}+ \alpha_{14}X_4+ e_4}$ Where Y_4 is sustainability of community water projects. X_4, -represent water user fee α_{04} is autonomous sustainability or sustainability independent of water user fee. α_{14} represent coefficients of water user fee e – error term, random variation due to other unmeasured factors
H_5 there is no significant relationship between capital structure and sustainability of community water project	$H_0\boldsymbol{\alpha= 0}$ $\mathbf{H_1\ \alpha\neq 0}$ F-test (ANOVA)	$\boldsymbol{Y_5=\alpha_{05}+ {}_+\alpha_{15}X_{5+}\ e_5}$ Where $\mathbf{Y_5}$= Sustainability of CWP ,$\mathbf{X_5}$ represents Capital structure. $\boldsymbol{\alpha_{15}}$= coefficient of capital structure $\boldsymbol{\alpha_{05}}$ = Autonomous sustainability **e** = error term, random variation due to other unmeasured factors
H_6 there is no significant intervening effect of management on the relationship between capital structure and sustainability of community water project	$H_0\ \alpha = 0$ $H_1\ \alpha \neq 0$ F-test (ANOVA)	$\boldsymbol{Y_6=\alpha_{06}+ {}_+ {}_+\alpha_{16}X4_+\alpha_{26}X_{5+}e_6}$ Where $\mathbf{Y_6}$ = Sustainability of CWP $\mathbf{X_5}$, $\mathbf{X_6}$represents capital structure and management respectively. $\boldsymbol{\alpha_{16}}$, $\boldsymbol{\alpha_{26}}$= coefficient of capital structure and management respectively α_{06} = Autonomous sustainability e = error term, random variation due to other unmeasured factors

3.8.1 Operationalization of Variables

The purpose of operationalizing or operationally defining a concept was to make it measurable. Table 3.5 describes the variables, the indicators of the study, the corresponding measurement scales and methods of data analysis that was carried out.

Table 3.6 Operationalization of Variables

Objective	Variable	Indicator	Scale	Method of Data Analysis
To establish the extent to which equity financing influences sustainability of community water projects in Kieni Constituency	**Independent Variable** Amount of Equity finance.	• Amount and adequacy of Equity contributed by the community. • Amount of non monetary contribution.	Ratio	• Mean,range score,Standa variation, coefficient of variation • Pearson's Product Moment Correlation Coefficient • ANOVA
To assess the extent to which grant financing influences sustainability of community water projects in Kieni Constituency	**Independent variable** Debt finance	• Amount of Debt finance from loans from banks. • Amount of non monetary debt	Ratio	• Mean score, Standard variation, • Pearson's Product Moment Correlation Coefficient • Multiple regression Analysis
To examine the extent to which debt financing influences sustainability of community water projects in Kieni Constituency	**Independent variable** Grant finance	• Amount and adequacy of finances donated by donors. • Type and sources of grant financing	Ratio	• Mean score, Standard variation, • Pearson's Product Moment Correlation Coefficient • Multiple linear regressio Analysis
To establish the influence of water user fees on sustainability of community water projects in Kieni Constituency	**Independent variable** Water user fee charged	• Amount and adequacy of fee charged. • Types of water tariffs • Penalties for non payment	Ratio	• Mean score • Pearson's Product Moment Correlation Coefficient • Multiple regression Analysis
	Dependent Variable Sustainability of community water supply project	• Adequate supply of water. • Condition of the water project infrastructure. • Level of functionality of water projects	Ratio	• Mean score, Standard variation

3.9 Ethical Considerations

The researcher first sought authority to carry out the research from the National Commission of Science and Technology and Innovation, Ministry of Water and Provincial Administration. All respondents were informed about the purpose of the study and the researcher guaranteed the participants confidentiality in the entire research process. Their identities were not revealed and numbers were used instead of their names, and all the information they gave were only used for the purpose of the study. The principle of voluntary participation was strictly adhered to and respondents were not coerced into participating in the research against their will. The right of respondents to withdraw from the study, before the end of data collection, if they felt offended was explained and upheld. None the respondents withdrew from the study midway. The study carried no known risks to the respondents. The research will also make available the finding of this study to community water project managers, community members, District Water Officer, bank managers as well as other stake holders upon request after completion of the study as one of the benefits.

3.10 Chapter Summary

This chapter covered this study's philosophical foundation which was realism, research design which was cross-sectional descriptive design, definition of study population which was all chairmen of community water projects, water beneficiaries in Kieni constituency, District water officers and bank managers in Nyeri Town. Sampling design was also covered in the chapter, as well as data collection methods, pilot study which was conducted in Laikipia, validity and reliability of the instruments, ethical considerations and data analysis methods which included both descriptive and inferential statistical analysis.

The following chapter covers the actual analysis of data, discussions of the findings and interpretation of the results.

CHAPTER FOUR
DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter covers analysis of data which was done by descriptive statistics and inferential statistical analysis. Tables were used to present analyzed data, followed by interpretations and discussions. This chapter covers the following sub-topics: response rate, background information of the respondents as well as the community water projects; analysis of functionality and sustainability of water projects; tests for statistical assumptions; analysis of equity financing; grant financing; debt financing and water user fee; effects of capital structure on sustainability of community water projects and management of community water projects; and analysis of management and Government policy.

4.2Questionnaire Return Rate

Questionnaire return rate refers to the total percentage of well filled and returned questionnaires from the identified sampled respondents of the study. The rate should be a representative of the population in order to allow for generalization and further analysis. Table 4.1 shows response rate of chairpersons of the community water projects.

Table 4.1: Response Rate of Chairpersons

Response	Frequency	Percent
Returned questionnaires	57	78
Non response	16	22
Target number	**73**	**100.0**

Table 4.1 shows the response rate of chairpersons. The returned and valid questionnaires for chairpersons were 78 percent. This high return rate of questionnaires could be attributed to self-administration of questionnaires by the researcher and the research assistants. This was deemed as adequate response for statistical analysis and generalization since according to Saunders *et al*. (2003), a 30

to 50 percent response rate is reasonable enough to make generalization of the population.

Similarly, the response rate of beneficiaries was high as shown in Table 4.2.

Table 4.2: Response Rate of Beneficiaries

Response	Frequency	Percent
Returned questionnaires	287	75
Non response	94	25
Target number	**381**	**100.0**

Table 4.2 shows response rate of beneficiaries of water from community water projects. The returned and valid questionnaires for the beneficiaries were 75 percent. This was deemed high return rate of questionnaires, which was attributed to self-administration of questionnaires by the researcher and the research assistants. This too was adequate response for statistical analysis and generalization since according to Saunders *et al*. (2003), a 30 to 50 percent response rate is reasonable enough to make generalization of the population.

All District Water Officers responded as well as all 9 bank managers were interviewed. The study also did observation of the 57 water projects that the chairpersons were available.

4.3 Demographic Characteristics of Respondents

This section covers analysis of gender of respondents, experience of chairpersons, academic level and age of respondents. Each chairperson and beneficiary of community water was asked about their gender, experience as chairperson, their highest academic level and their age in the questionnaires. The analysis of these variables is present in Table 4.3.

Gender of the respondents was important in this study since gender issue is a key cross-cutting variable in any development project. Involvement of especially women

in leadership is viewed as progressive hence the need to analyse gender. The experience of chairpersons was important in this study since management was an important aspect in soliciting for capital for the projects as well as ensuring sustainability of the community water projects.

Academic level of chairperson was an important indicator of management capacity to manage community water projects effectively. The higher the level of education, the more likely the community water project will be managed. Age of chairpersons was analysed since its analysis revealed involvement of youths in leadership of community water projects.

Table 4.3 Demographic Characteristics

Demographic Factor	Frequency	Percentage	Mean	Standard Deviation	Coefficient of Variation
Gender of the Chairpersons					
Male	52	91			
Female	5	9			
Total	**57**	**100**	**1.09**	**0.285**	**26%**
Gender of Water Beneficiaries					
Male	116	40			
Female	171	60			
Total	**287**	**100**	**1.667**	**0.877**	**53%**
Experience of Chairperson					
< 1year	18	31			
2-3years ago	24	42			
3-5yearrs ago	6	11			
5-10years ago	7	12			
>10years ago	2	4			
Total	**57**	**100**	**3.16**	**1.533**	**48%**
Academic Qualifications					
Primary	9	16			
Secondary	34	60			
Certificate	14	24			
Total	**57**	**100**	**1.82**	**0.63**	**35%**
Age	**Frequency**	**Percentage**			
31-40yrs	5	9			
41-50yrs	16	28			
51-60yrs	29	51			
>60	7	12			
Total	**57**	**100**	**3.97**	**0.411**	**10.4%**
Age of Water Beneficiaries					
18-29	19	6.6	53	**9.8**	**36%**
30-39	28	9.8			
40-49	61	21.3			
50-59	148	51.5			
Over 60	31	10.8			
Total	**287**	**100**			

4.3.1 Gender of Respondents

On gender of the chairpersons, Table 4.3 shows that 91 percent chairpersons were male and only 9 percent were female. This depicted huge gender disparity in leadership of community water projects. Women were under represented in leadership of community water projects. This was contrary to beneficiaries who were mostly women, that is, 59.6 percent of all beneficiaries were female while male were 40.4 percent. This showed that majority of water users respondents were female. This is because in majority of households, females were responsible for cooking in families as well as laundry and other domestic chores. Women under representation in community water project leadership leaves male gender to dominate who have less interest in water as compared to women.

4.3.2 Experience of Chairpersons

The chairmen were asked how long they had served as chairmen, which reflected their experience. Table 4.3 shows that 31 percent of chairpersons had experience of less than one year, 42 percent between 2 and 3 years of experience, 11 percent between 4 and 5 years, 12 percent between 5 and 10 years while only 4 percent had experience of over 10 years. This indicated that, majority of chairpersons, that is 76 percent, have been chairperson for less than 3 years. This revealed majority of chairpersons did not have many years of experience. The coefficient of variation of 48 percent meant that, there was high dispersion of experience of chairpersons from the mean or central tendency of chairperson's experience. Indicating there were some chairpersons who had long years of experience and others had been chairperson for less than one year.

4.3.3 Academic Level of Chairpersons

Respondents were asked about their highest level of academic achievement using the questionnaire. Academic level of chairperson was an important indicator of management capacity to manage community water projects effectively. The higher the level of education, the more likely the community water project will be managed. Table 4.3 shows chairpersons' academic level distribution.

The results showed that 16 percent of chairpersons had their highest academic as primary education, 60 percent had secondary school certificate while 25 percent

certificate in tertiary education. While all chairpersons had basic education none had a degree.

The standard deviation of 0.63 and coefficient of variation of 35 percent indicated that there was small dispersal of education level of chairpersons from the central tendency. Meaning, majority of chairmen had similar education level. This was a low education level for chairpersons managing community water projects worth millions of shillings and serving many people.

4.3.4 Age of Chairpersons

Respondents were asked about their age. Age of chairpersons was analysed since its analysis revealed involvement of youths in leadership. Table 4.3 showed that none of the chairperson was under 30 years of age, 9 percent were aged 31 to 40 years, 28 percent between 41-50 years of age, 51 percent aged between 51-60 years and 12 percent were over 60 years of age. A mean 3.97 showed that majority of chairpersons were aged between 51-60 years. A standard deviation of 0.41 and a coefficient of variation of 10.4 percent depicted that; there was fairly little dispersion of chairpersons' age from the central tendency. Meaning, most chairperson were in the same range of age. This indicated that majority of chairpersons were mature since they were 50 and above year old however, there was underrepresentation of youths in leadership of community water projects.

4.4 Background Information of Water Projects

This section covers analysis of information regarding the type of the community water projects, location of the projects, when the projects were started, as well as the cost of the community water projects. This information was important for contextualizing the findings and in drawing conclusions and recommendations.

4.4.1 Types of Water Project

Table 4.4 shows distribution of types of the water projects under the study.

Table 4.4: Type of project

Type	Frequency	Percentage
Gravity Water Projects	40	70
Boreholes	6	11
Dams	11	19
Total	57	100

From Table 4.4, 70 percent were gravity water project, 11 percent were boreholes and 19 percent were dams and water pans. Majority of projects were gravity water systems.

The study established that, all beneficiaries who participated in the study, required water for domestic purposes, livestock and irrigation of crops either for commercial purposes or subsistence due to inadequate rainfall in the area.

4.4.2 Distribution of Projects per Location in Kieni Constituency

On location of the community water project, respondents were asked the location of their water projects. Table 4.5 shows distribution of the water projects across locations in Kieni Constituency. The distribution of the water projects was fair across the constituency, in that each location had representation of water projects.

Table 4.5: Location of Projects

Location	Frequency	Percent
Endarasha	1	1.8
Gakawa	8	14.1
Gataragwa	7	12.3
Kabaru	8	14.1
Kiamathaga	6	10.5
Mugunda	6	10.5
Mweiga	7	12.3
Mwiyogo	5	8.8
Naromoru	3	5.3
Thegu	6	10.5
Total	57	100.0

From Table 4.5, Endarasha location and Narumoru locationhad the least number of community water projects. Endarasha bordered Aberdare Ranges and receives

adequate rainfall hence had little water problems as compared to other locations in the constituency. Naromoru location on the other hand, was a rural urban location which was served by NAROWASCO which provides water to a majority of residents of Naromoru location. This is a limited company under water service providers which was not a community water project therefore not part of this study. The rest of the locations had water projects evenly distributed across Kieni Constituency.

4.4.3 Age of Community Water Project

The chairpersons were asked when the project was initiated. Analysis of age of the project was important in determining sustainability of community water projects. Sustainability of projects is best analysed in the context of time which is displayed in Table 4.6.

Table 4.6: Age of Projects

Age	Frequency	Percent
10-20yrs	12	21
20 and over	45	79
Total	**57**	**100.0**

Table 4.6 shows that 79 percent of all projects were started over 20 years ago and 21 percent between 10 and 20 years. None of the community water project was initiated less than 10 years, therefore making sustainability of the community projects possible for assessment. This is because time element is key in sustainability assessment. World Bank (2011) defined sustainability as the ability of a project to maintain an acceptable level of benefit flows through its economic life while WHO (2000) defined it as the ability of a project to continue to function effectively for the foreseeable future. Brikke and Davis (1995) also referred to sustainability in rural water supply to mean that water facilities are maintained in a condition which ensures a reliable and adequate water supply and that benefits of water provision continue to be realized over a prolonged period of time. All these definitions of sustainability focused on element of time, and 10 years and above was adequate time to assess sustainability.

4.4.4 Costs of Community Water Projects

Chairpersons' questionnaire asked about the cost of the community water projects. Cost of community water reflects the capital structure of community water projects. Table 4.7 shows that, total expenditure on community water projects in Kieni constituency was Ksh.854 million from the community water projects with a standard deviation of Ksh. 14.837 meaning, community project costs were dispersed from the mean or central tendency by Ksh.14.837 million.

Table 4.7: Costs of Water Projects

Sum (Ksh)	Mean (Ksh)	Std. Deviation	Coefficient of variation	Maximum (Ksh)	Minimum (Ksh)
854m	15.53m	14.837	96%	53m	2m

The extent of variability to mean was given by the coefficient of variance of 96 percent. This showed that, the cost of community water projects varied largely from one project to another. The highest project cost was 53 million while the lowest was Ksh. 2million. These variations was as a result of the type of the project which require different amount of money to construct, and the management's aggressiveness in initiating bigger community water projects as well as the number of water beneficiaries.

4.5 Tests for Statistical Assumptions

Before conducting statistical analysis, tests for assumptions is important because it shows the extent to which the findings can be generalized. This section covers tests of normality, multicollinearity, homoscedasticity and heteroscedasticity which were carried out. Field (2009) indicated that violation of statistical assumptions can invalidate statistical anlysis.

4.5.1 Tests of Normality

To conduct regression analysis, one assumes that data was collected from normal population (Moriya, 2008). Invalidation of regression analysis would result if there is violation of this assumption. In this study, to ascertain whether the research data was

collected from a normal population, Kolmogorov-Smirnov test statistic (KS-test) and Shapiro-Wilk test (SW-test) were carried out as shown in Table 4.8. Kolmogorov-Smirnov test statistic (KS-test) determines if two datasets differed significantly without making any assumption about the distribution of data. In addition to calculating the D statistic, KS-test indicated whether the data was normal or non-normal. The KS-test quantified a distance between the empirical distribution function of the sample and the cumulative distribution function of the reference distribution, or between the empirical distribution functions of two samples (Corder and Foreman, 2009). In testing whether a population is normal by use of SW-test, statistic, the null hypothesis was rejected if the value of W was too small (Shapiro and Wilk, 1965).

Table 4.8: Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Level of Sustainability	.510	37	.0124	.403	37	.0431
Adequacy of equity financing	.428	37	.0439	.666	37	.0219
Adequacy of Grant Financing	.234	37	.0350	.838	37	.0182
Adequacy of Water User Fees	.506	37	.000	.445	37	.000

a. Lilliefors Significance Correction

Table 4.8 shows that, all the SW-test statistics were approaching 1(1 > 0.05) and hence the null hypothesis that the population was not normal was rejected. In conjunction with the W values, the p-values were also checked while using the SW-test statistic. In this case, if the p-value was more than the chosen alpha level, the null hypothesis was rejected and concluded that the set of data values were from a normally distributed population (Shapiro and Wilk, 1965). Results in Table 4.8 shows that, the alpha level was 0.05 and in all variables, $p > 0.05$ and hence it was concluded that the research population was normally distributed. This meant that the population had representation of all sections and subgroups. Hence, statistical results can be generalized. The results of Kolmogorov-Smirnov test statistic and Shapiro-Wilk test are presented graphically by Figure 4 which showed normal distribution curve.

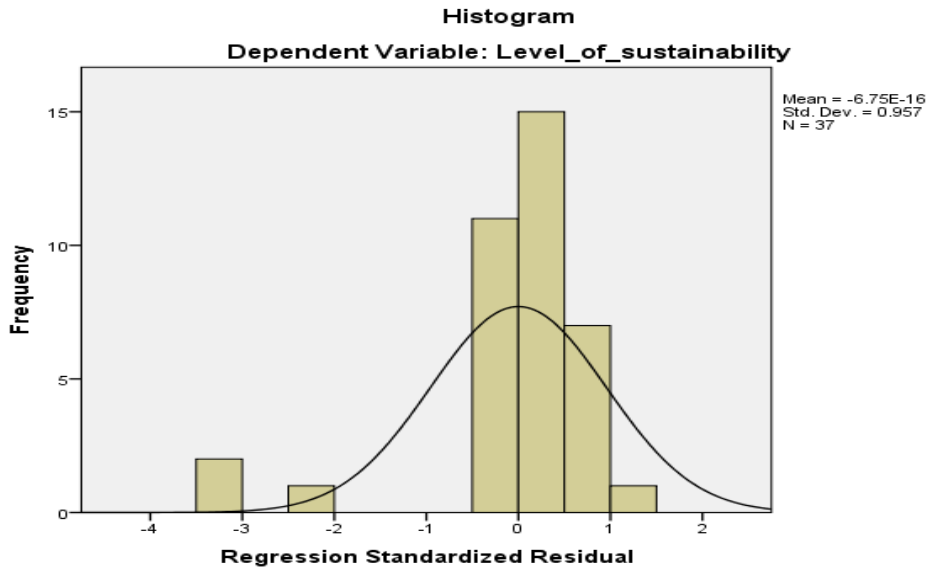


Figure 4: Histogram for Normality test

4.5.2 Test of Multicollinearity

Multicollinearity exists when there is a strong correlation between two or more predictors in a regression model (Field,2009). Multicollinearity poses a problem for multiple regression because simple regression requires only one predictor. Perfect collinearity exists when at least one predictor is a perfect linear combination of the others (the simplest example being two predictors that are perfectly correlated – they have a correlation coefficient of 1). If there is perfect collinearity between predictors it is impossible to obtain unique estimates of the regression coefficients because there are an infinite number of combinations of coefficients that would work equally well.

Statistical Package for Social Science (SPSS) helped in collinearity diagnostics, one of the tests was the variance inflation factor (VIF) (Field, 2009). The VIF indicates whether a predictor has a strong linear relationship with the other predictor(s). Myers (1990) suggests that a value of 10 indicates presence of collinearity. Related to the VIF is the tolerance statistic, which is the reciprocal (1/VIF). As such, values below 0.1 indicate serious problems of multicollinearity. Table 4.9 presents the results of multicollinearity tests.

Table 4.9: Test of Multicollinearity

Model		Collinearity Statistics	
		Tolerance	VIF
1	Adequacy of Equity Financing	.993	1.007
	Adequacy of Grant Financing	.943	1.061
	Adequacy of Water User Fee	.940	1.063

a. Dependent Variable: Level of sustainability

Table 4.9 shows the calculated VIF of around 1 and a tolerance statistic of 0.9 indicating absence of multicollinearity, meaning independent variables were not influencing one another hence multiple regression analysis could take place.

4.5.3 Tests for Homoscedasticity and Heteroscedasticity

Scatter diagrams were plotted prior to undertaking correlation analysis to counter check homoscedasticity and heteroscedasticity. In statistics, a sequence of random variables is homoscedastic if all random variables in the sequence have the same finite variance. Although the assumption of homoscedasticity simplifies mathematical modeling, Moriya (2008) argues that serious violations in homoscedasticity may result in overestimating the goodness of fit as measured by the Pearson coefficient although this does not invalidate regression results. In this study, homoscedasticity was checked by looking at scatterplots between each predictor variable and the dependent variable to ascertain that the cluster of points were approximately the same width in the residuals plots derived by SPSS.

Heteroscedasticity is the absence of homoscedasticity. A collection of random variables is heteroscedastic if there are sub-populations that have different variability from others. Heteroscedasticity in regression analysis can invalidate statistical tests of significance that assume that the modeling errors are uncorrelated and normally distributed and that their variances do not vary with the effects being modeled. In Spherical-Homoscedastic Distributions, Hamsici and Aleix (2007) argued that the correlation and residual tables generated by SPSS that are used to test for collinearity can also be used to check for existence of heteroscedasticity. In this study, the test of heteroscedasticity was done by drawing a scatter diagram as presented by Figure 5.

Figure 5 shows heteroscedasticity assumption was not violated. From the figure, there were no obvious outliers and no obvious sub-populations on this plot, and the cloud of dots were evenly spaced out around the line, indicating homoscedasticity. The sequence of random variables is homoscedastic since all the dots in the sequence seem have the same finite variance.

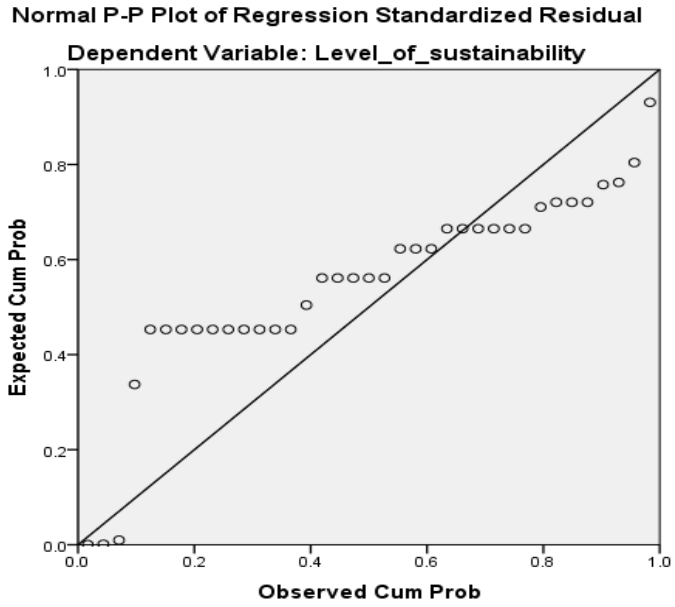


Figure 5: Scatter Diagram for Test of Homoscedasticity/Heteroscedasticity

4.6 Descriptive Statistical Analysis

This section present descriptive analysis of sustainability of community water projects which was the dependent variable; and independent variables that is, equity financing, debt financing, grant financing, and water user fee. It also covers descriptive statistical analysis of the mediating variable, management of community water projects. The analysis involved calculating the means, standard deviations and variance.

4.6.1 Sustainability of Water Projects

Sustainability of community water projects was the study dependent variable. Sustainability was assessed by calculating the aggregate of three indicators which

were; the level of functionality of community water projects, the status of water project infrastructure and adequacy of water provided by the water projects.

An observation sheet was used to collect data on functionality and sustainability of community water projects. Level of functionality was assessed by 5 point scale, that is, Fully functioning 5 (Uninterrupted water supply for the past 6 months), functioning with some problems 4 (less than 1week interrupted water supply due to breakdown), neutral 3 (between 2 -4 weeks of interrupted water supply as a result of breakdown), functioning with many problems 2 (more than 1 month of interrupted water supply) and not functioning at all 1 (Does not supply water). Table 4.10 shows the results of status of functionality of community water projects in row 1.

Another indicator for sustainability was status of water project infrastructure which was assess on a five point likert scale, where very good was 5, good 4, neutral was 3, poor was 2 and very poor was 1. The analysed water projects infrastructure were, water pumps, pipes, tanks, taps, impounding ware, spill way, cattle troughs and other facilities. Table 4.10 shows the results of status of functionality of community water projects in row 2 to 10.

The third indicator for sustainability was adequacy of water provided by community water projects. Adequacy of water was examined by a five point likert scale through asking water beneficiaries their opinions on adequacy of water. The scale was “very adequate” (5), “adequate” (4), “neutral” (3), “inadequate” (2) and “very inadequate” (1). The results are presented in Table 4.10 row 11.

Table 4.10 Sustainability of Community Water Projects

Level of Sustainability					
	N	Mean		Std. Deviation	Variance
	Statistic	Statistic	Std. Error	Statistic	Statistic
Level of functionality	57	2.75	.107	.808	.653
Status of Pumps	6	2.67	.494	1.211	1.467
Status of Pipes	53	2.82	.114	.827	.684
Status of Tanks	41	2.65	.096	.615	.378
Status of Taps	44	2.82	.109	.724	.524
Status of Other facilities	36	2.83	.093	.561	.314
Status of intake ware	8	2.83	.460	1.302	1.696
Status of Impounding ware	11	2.84	.364	1.206	1.455
Status of Spill way	7	2.86	.340	.900	.810
Status of Cattle trough	10	2.80	.306	.966	.933
Adequacy of water supply	57	2.13	.467	1.008	1.0161
Level of sustainability	**57**	**2.727**	**.08173**	**.617**	**.381**

Table 4.10 shows that, level of functionality was 2.75 meaning the level of functionality skewed towards functioning with many problems (Fully functioning 5 (Uninterrupted water supply for the past 6 months), functioning with some problems 4 (less than 1week interrupted water supply due to breakdown), neutral 3 (between 2 -4 weeks of interrupted water supply as a result of breakdown), functioning with many problems 2 (more than 1 month of interrupted water supply) and not functioning at all 1 (Does not supply water). A standard deviation of 0.808 showed that functionality of most community water projects did not have huge variation. This meant that, most projects had similar functionality status, that is, they were functioning with many problems. This study finding negated with the findings of Sutton (2004) which found out that, there were large percentage of non-functioning water systems, with the percentage of functioning water systems in rural areas ranged from 35-80 per cent. This study established that only 9 percent were non-functional but 91 percent were functioning albeit most with many problems.

This study also found out that 75 percent of boreholes were non-functional. This findings concurs with those of Hysom (2006) in a study in South Africa which

documented that, as many as 70 percent of the boreholes were non-functional, while in Tanzania, on average, 45 percent were in operation, and only 10 percent of water supply systems that were 25 years or older were still functioning (Haysom, 2006).

The second indicator for sustainability was status of water project infrastructure which was assess on a five point likert scale where very good was 5, good 4, neutral was 3, poor was 2 and very poor was 1. The analysed water projects infrastructure were, water pumps, pipes, tanks, taps, impounding ware, spill way, cattle troughs and other facilities. The results in Table 4.10 revealed that, the mean was over 2.5 for all the water project infrastructure. This meant that, the community water projects infrastructure status were in good condition. The standard variation of pumps, pipes, water intake infrastructure, impounding ware, spill way and cattle trough tanks, taps and other facilities, indicated that, the deviations were minimal from one project to the other. Therefore, the status of most projects' infrastructures was not very varied to a large extent from each other.

The third indicator for sustainability of community water project was adequacy of water provided by the projects. Adequacy of water provided was assessed by five point likert scale which was in the water beneficiaries' questionnaires. Table 4.10 shows that the mean was 2.13 meaning, majority of water projects were not supplying adequate water. This revealed that, most people in Kieni Constituency lacked adequate water. These responses had a standard deviation of 1.008 and a coefficient of variation of 45 percent which implied that, responses from water beneficiaries were considerably spread away from the mean, which meant some water projects were supplying adequate water to beneficiaries but majority supplied inadequate water. These findings concurred with those of UNICEF and WHO (2012) which established most people in Kenya are without access to safe drinking water. In addition, the findings of this study concurs with Yahaya (2004) who found out that, Africa is the region that suffers from inadequate access to water supply. He noted that, of 55 countries in the world whose domestic water use was below 50 litres per capita per day, 35 are in Africa.

Given the status and functionality of water project infrastructure that was established to be above average, this meant that lack of adequate water was not as a result of poor water project infrastructure. The projects infrastructures were in good condition but supplies inadequate water.

Aggregate level of sustainability in this study was measured by analysis of levels of functionality, status of water project infrastructure and adequacy of water provided by community water projects as shown in Table 4.10. The composite mean of sustainability levels was 2.727. This meant that, most water projects were sustainable since the mean was above neutral and skewed towards sustainability.

4.6.2 Equity Financing of Community Water Projects

Equity financing was the first independent variable of the study. Equity finance in the study was assessed by analysis community contribution in form of cash contribution and labour contribution. This was examined by asking chairpersons and beneficiaries through questionnaires: amount of cash contribution, problems of collecting the community cash, reasons for non-payments and non-completion of payment, and adequacy of equity contribution. Table 4.11 shows a summary of descriptive statistical analysis of equity financing.

Table 4.11 Descriptive Statistical Analysis of Equity Financing

	Frequency	Percent	N	Mean Statistic	Mean Std. Error	Std. Deviation Statistic
Cash contribution						
Yes	40	70	57	1.30	.061	.462
No	17	30				
Amount Contributed	40	100	40	9357.50	325.771	2060.357
Problems in Cash collection (Yes)	40	100	40	1.00	.000	.000
Adherence to Payment	1	2.5	40	1.97	.025	.158
Yes	39	97.5				
No						
Reason for Nonpayment						
Poverty	5	12.5				
Non Payment	4	10				
Unreliable Income	22	55	40	1.87	.089	.563
Lack of Goodwill	3	7.5				
Expansive Area	5	12.5				
Conflicts	1	2.5				
Labour Contribution						
Yes	39	100	38	1.00	.000	.000
Number of Days Worked			39	368.85	21.154	132.106
Adequacy of Equity						
Very Adequate	0	0				
Adequate	1	2.5				
I can't Tell	10	25	40	3.73	.088	.554
Inadequate	28	70				
Very Inadequate	2	2.5				

Cash Contribution

On community cash contribution, Table 4.11 shows that in 70 percent of all the projects community contributed their own funds for the water projects while in 30 percent of the community water projects community did not give any contribution. The 70 percent were all gravity water systems and the other 30 percent of the projects where community did not give cash as their equity contribution were dams and boreholes. The Government fully financed the construction of water dams and boreholes without any community contribution.

The amount of cash contributed by the community had a mean of Ksh.9,357. This showed that the community equity contributions were not the same and differed significantly from one project to another. The standard deviation of Ksh.325 meant that the amount of cash contributed by water beneficiaries to a large extent, were not very dispersed. Most members contributed amounts that were not very different from each other. This amount contributed by communities for water projects was low. These findings concurred with those of Whittington et al (2008) who identified that rural communities in Boliva, Peru and Ghana were not paying for construction of water projects and maintenance as required hence collecting insufficient funds to support projects which led to lack of ownership. The lack of ownership led to lack of sustainability of water projects.

Problems in Collection of Equity Funds

Table 4.11 shows that in all the projects where community members gave equity contribution in terms of cash, there were problems in collecting the money. Majority actually did not adhere to payment of the full amount required as shown in Table 4.11.

The reason for problems was non-payment of the required fee by the community. One chairperson said that:

> Community members normally incite each other not to pay.

Another respondent noted that:

> …To call community members for a meeting to discuss payment of

water user fee is normally not possible since members will not come. Going house to house is very difficult because people only make promises so that you leave them but do not pay a coin.

In addition, another chairperson noted that:

…Community members only pay first installment then, then abscond payment the other amount. They do this to get water connection.

These findings demonstrated problems of funding community projects through equity financing.

Table 4.11 also shows that in 97.5 percent community water projects, community did not pay the entire amount required while in only 2.5 percent all community members paid the required amount of cash as their equity contribution. These findings indicated that, there was unwillingness by the community members to give water provision support it deserved. This lack of initiative of paying promptly their equity contribution affected sustainability of the community water projects negatively. As Chogul (2000) observed in her study on participation in the housing sector in developing countries. She found out that, where initiatives existed in a community, to improve living conditions, be they top-down or bottom-up, led to sustainability of such development projects. The reasons for reluctance to pay full amount is summarized in Table 4.11.

The causes of the problem of collecting cash were poverty among community members 12.5 percent, outright nonpayment 10 percent, unreliable income of the community members 55 percent, lack of goodwill 7.5 percent, and the area was very wide hence difficult to collect the money 12.5, and conflicts 2.5 percent as shown in Table 4.11. Some of the responses from them were as follows.

One of the chairpersons of community water project in Kieni West said that:

> …most people in Kieni are poor and even to get food is a problem because most depend on provision of causal labour in onion farms and are paid very little. Piped water is not their top priority (A chairperson from Kieni West)

This meant that, some community members do not give water projects priority. They have more pressing needs. However, another chairperson noted that, some community members just abscond and refuse to make payment of equity finance without any valid reason. He noted that:

> …some people are employed with government and have regular income, yet the refuse to pay without any reason… (A chairperson from Kieni West)

Another chairperson who was newly elected from Kieni East candidly noted that:

> …community members refused to pay because of wrangles and conflict within the officials and members. People cannot pay when they do not trust the leadership of the water project… (A chairperson from Kieni East)

This meant that, conflicts within water projects also contributed to non-payment of equity finance.

The study also found out that, the water management committees did not have any way of compelling community members to make payment for construction after water is connected. They can only apply social pressure in meetings.

Labour Contribution

Labour contribution was part of equity financing, where community members give their labour during construction of community water. It was calculated by number of days worked. Table 4.11 shows that community members provided labour for gravity water projects only. These findings were in line with other scholar who found out labour provision can boost ownership and hence sustainability. Such scholars include Kleeimer (2002), who documented that, one donor in Tanzania even paid villagers to

provide unskilled labour. Development agencies and governments alike, involved, particularly in rural water supply, have had to re-evaluate community's active role in water projects. This was expected to boost sustainability of water projects through equity contribution by the community members or beneficiaries.

The mean number of days worked was 369 days. This translated to provision of labour by community members for a whole year. This could affect community ability to generate income and cater for their household needs, because when providing labour for the water project, the community members were not paid. This therefore means provision of labour affected the community's ability to generate income.

Adequacy of Community Cash Contribution

The respondents were asked to rate the adequacy of cash contributed by community members. Table 4.11 shows that, community contribution in majority of community water projects was inadequate, that is, 70 percent felt community contribution was inadequate, 2.5 percent felt it was very inadequate, 2.5 percent felt it was adequate and 25 percent could not tell. Community did not contribute adequate funds for the construction of the community water projects. This meant that community water projects required other sources of finance to complete construction of the projects.

4.6.3 Grant Financing and Sustainability of Community Water Projects

Grant financing was the second study variable under objective two of the study. Grant financing referred to funds and other resources given to community water project from external stakeholders without requirement of repayment. This section analysed funds from Ministry of Water, National Arid Lands Authority, foreign donors and Constituency Development Funds and how these grants influence sustainability of community water projects.

Ministry of Water Funds

Ministry of Water gives funds to community water projects. The respondents were asked whether their project received any fund from the Ministry of Water. The results of number of projects that receive these funds are shown in Table 4.12.

Table 4.12 Ministry of Water Grants

	Frequency	Percent	N Statistic	Mean Statistic	Mean Std. Error	Std. Deviation Statistic
Amount Received from MoW	57	100	57	9.61	.764	5.766
Accessibility of MoW funds						
Very accessible	2	3.5	57	2.84	.119	.902
Accessible	20	35.1				
I cant Tell	22	38.6				
Inaccessible	11	19.3				
Very Inaccessible	2	3.5				
Adequacy of MoW Funds						
Very Adequate	3	5.3	57	3.30	.128	.801
Adequate	20	35.1				
I cant tell	25	43.9				
In adequate	9	15.8				
MoW funds for O&M						
Yes	1	2	39	1.95	.036	.223
No	56	98				
Accountability of MoW funds						
Project Committee	2	4				
District Water Officer	55	96	37	3.03	.027	.164
Others	0	0				

All community water projects received grants from the Government for construction of the water projects. Table 4.12 indicates that, the average amount received was Ksh.9.61million with a standard deviation of 5.766.

In terms of accessibility of Ministry of Water Funds, the respondents were asked to rate accessibility in a Likert scale that is, Very accessible 5, accessible 4, I can't tell 3, inaccessible 2, and very inaccessible 1. The results shown in Table 4.12 show that, 3.5 percent of the chairmen felt that Ministry of Water grants are very accessible, 35 percent felt it was accessible, 19 percent felt it was inaccessible and 3.5 percent felt it was very accessible. 38 percent could not tell. The mean of 2.84 shows that majority of the water chairperson felt that Ministry of water grants was inaccessible. A standard deviation of 0.902 and coefficient of variance of 32 percent shows that the responses were fairly spread between accessibility and inaccessibility of funds meaning there was divergent opinion in terms of accessibility of Ministry of Water funds from the respondents.

The reasons given for inaccessibility included the funds have to be approved by parliament, it is requested through proposal writing which majority did not know how to prepare, lack of personnel to provide information and advice, and takes time to acquire it besides being free funds.

On how to improve accessibility Ministry of Water funds, one chairperson from Kieni East said that:

> ... The Government should provide more people to help in writing grant proposals, quick approvals by Officials and quick allocation by Government... (A chairperson from Kieni East)

These findings revealed that, the community water projects had a problem of preparing grant proposals. There was also problem of availability of professionals who can prepare grant proposals for community water projects.

The respondents were asked to give their opinion on adequacy of ministry of Water Grants. They were required to rate adequacy on a five point scale, that is, Very inadequate 1, inadequate 2, I can't tell 3, adequate 4 and very adequate 5. The results displayed in Table 4.12 shows that only 15.8 percent of all chairperson felt that grants from the Ministry of Water were inadequate, 35 percent felt it was adequate, 5 percent felt it was very adequate while another 43.9 percent did not have an opinion. A mean

of 3.30 indicates that majority of chairmen were neutral, that is, they could not tell if Ministry of water grants were adequate or not and their responses varied by 24 percent. This showed that chairmen of community water could not say if the funds were adequate. This could be attributed to the fact that they were not accountable for the Ministry of Water grants as shown in the last row of the Table 4.12.The results indicated that, the District Water Officers account for the Ministry of Water grants in 96 percent of the community water projects while Community water committee account in only 4 percent of the water projects. This meant that, despite the project being owned by the community, the community had no say on how the funds were used. The community did not know how much the funds were used in the projects and in doing what.

In addition, all community water chairpersons did not have a problem with the District Water Officers accounting for the Government funds. The reason for this was well put by one of the chairpersons from Kieni West who said:

> …DWOs are the ones to account for the funds because they are Government agents, they understand procurement process, know the materials that are needed for construction of water projects and they are the experts…(A chairman from Kieni East)

As for operations and Maintenance, the respondents were asked whether they receive grants to facilitate operations and maintenance. The results shown in Table 4.12 showed that, 98 percent of water projects did not receive money for operations and maintenance while only 2 percent received. The one project that received money for operation and maintenance was from Kieni West, where Tana Water had seconded a manager to professionally run the community water project. The manager felt that government grants for operation and maintenance were not enough.

Other Donor Funds in Community Water Projects

Chairpersons were asked whether community water projects received any grant from other donors. The results are shown in Table 4.13.

Table 4.13 Other Donor Funding in Community Water Projects

			N	Mean		Std. Deviation
	Frequency	Percent	Statistic	Statistic	Std. Error	Statistic
Projects in Receipt of Donor Funds			57	1.30	.061	.462
Yes	40	70				
No	17	30				
Adequacy of Donor Funds						
Very Adequate	3	7.5				
Adequate	1	2.5				
I cant Tell	31	77.5	40	2.95	.107	.677
Inadequate	5	12.5				
Very Inadequate	0	0				
Donor Funds for O&M						
Yes	1	2	39	1.97	.026	.160
No	56	98				
Accountability of Donor Funds						
Project Committee	3	8.8				
District water	3	8.8	34	3.65	.152	.884
Officer	28	82.4				
Donors						
C.D.F funds						
Yes	26	68	39	1.33	.076	.478
No	13	32				
Amount of CDF received						
Yes	24	60	24	947916.67	140376.02	687699.246
No	16	40				
National Arid Lands Authority						
Yes	17	45	38	1.55	.082	.504
No	21	55				
Amount of NALA Received			16	7965000.0	3595561.84	14382247.4

Table 4.13 shows that 70 percent of community water projects received donor funds for construction of community water projects while 30 percent did not. The study also established that only gravity water projects received donor funds for construction.

Boreholes and dams did not receive any of amount from donors. Appendix 1 shows the list of all donors. 100% of the recipients for donor funds said the funds were accessible and also 100% said donor gave conditions. The main condition is the community must provide their own resources and all permits and approvals by relevant agencies done before funding.

Respondents were asked to rate their opinion on adequacy of donor grants to community water projects. They were expected to rate adequacy using a Likert scale where, very adequate=5, adequate=4, I can't tell=3, inadequate=2 and very inadequate=1. The results shown in table 4.13 shows that, only 7.5 percent of chairmen of community water projects that received donor funds for construction felt that donor fund were very adequate, 2.5 percent felt the funds were adequate and 12 percent felt it was inadequate. Majority could not tell the adequacy of the funds received. This was because; most donors funding community water projects did so without being requested by the community and most account for the funds themselves. Water committee did not have any say in management of donor funds as shown in Table 4.13.

Table 4.13 shows that in 8 percent of the community water projects, project committees accounted for donor funds, in 3 percent was accounted by District Water Officer while in majority, 89 percent of water projects receiving donor grants, donors themselves accounted for the money they grant. This meant that community did not have a say on how donor funds were used. As for operation and maintenance, only 2 percent of all water projects received funds for operational and maintenance, as shown in Table 4.13.

Respondents were asked whether their community water project received any grant from CDF. The responses are displayed in Table 4.13. Table 4.13 shows that 60 percent of gravity water projects received grants from CDF kitty. All the other projects did not receive any funds from CDF. The amount received ranged between Ksh.200,000 and Ksh.3million. Total sum received was Ksh.22.75 million with a mean of approximately Ksh.948,000 with a standard deviation of Ksh.687,700 meaning that, there was very high dispersal of the amount received by projects from

the mean amount. This varied distribution of CDF among projects could be because; the politicians controlled the kitty and accessing it, was based on connections and goodwill from Member of Parliament or the CDF committee.

Respondents were asked whether there community water project received any grants from National Arid Lands Authority, the results are shown in Table 4.13.

Table 4.13 shows that 45 percent of all projects received grants from National Arid Lands Authority (NALA). The amount granted had a range of Ksh.59,800,000 with a minimum amount of Ksh.200,000 and maximum of 60,000,000. The mean of the grant was Ksh. 7,965,000 with a standard deviation of Ksh.1,438,224. This depicted huge variation of grants between projects. This could be as a result of water project committee being aggressive in soliciting for funds or policy of National Arid Lands Authority to fund specific projects.

4.6.4 Debt Financing of Community Water Projects

The study objective three sought to investigate influence of debt financing on sustainability of community water project. The chairpersons of community were asked whether their water project had obtained debt finance from any financial institution or acquired any asset using debt option. The result established that, all the projects had not obtained a loan from any bank nor did community water project acquire any asset using debt option. The reasons given was that, they were afraid they may not be able to repay the loans, their collection as water user fees may not be able to service the loan or income inconsistency, loans are expensive, lack of knowledge as to how to obtain the loans. One of the chairpersons said that:

> …Banks cannot lend money to us because the community water project does not have a title deed to give it to the bank as security and also loans are very expensive because of interest and community members do not promptly pay for water usage (A chairperson from Kieni West)

Another chairperson from Kieni East noted that:

> …no bank can give loans to a community water project they only lend business people. (A chairperson from Kieni East)

This finding concurred with those of Thomas and Wienhold (1982) which asserted that, debt financing bring about liquidity crisis which may adversely affect operating policies of organizations. Managers who fear incurring liquidity constraints or violating debt covenants will usually avoid debt finance. These two scholars saw the negative side of debt financing such as, fear of violating debt covenants which could result in constraining management in exploiting opportunities for the betterment of the projects. This fear of default in repayment pushed management of community water projects to opt for other sources of finances.

Interview with bank managers revealed that community projects do not seek for debt financing. All bank managers were cautious in advancing loans to community based projects. The reason given was that, it was difficult to hold the community to account, poor management systems that changes leadership often and poor financial performances, that is, community projects do not generate sufficient revenues or lack of accountability by their leaders. In addition, most bank managers felt that most community projects are political in nature and banks avoid political risk. One bank manager in Nyeri town said these during the interview:

> …Community projects are difficult to fund because they lack security to guarantee loans, they are amorphous since they are not corporate bodies with a structured management, and are not profit making therefore repayment of loans not assured (A bank Manager from Nyeri Town).

However, on funding water projects, most bank managers revealed they can advance a loan to community water projects, if the community water projects bank with them, and exhibit proper financial performance over reasonable time. These findings concur with those of Chandra (2008) that, financial institutions and banks were more comfortable in lending against stable, tangible assets like machinery, than an amorphous institution such as a community water project which is not a company. In addition, community water projects do not own tangible assets with high resale values to be used as collateral for debts. Most of the assets belonging to a community water project are mostly specialized equipment for water services only and hence have low resale value. This therefore means that they cannot be used as collateral for loans.

However, advantages of debt were revealed. Such advantages may include provision of low cost monitoring for projects and additional funding of community water project which were inadequate.

4.6.5 Water User Fee and Sustainability of Community Water Projects

Objective four of the study sought to establish the influence of the water user fees on sustainability of community water projects. Water user fee was analysed by assessing water connection fees, charges for water consumption and adequacy of water user fee as shown in Table 4.14.

Water Connection Fee for New Members

Respondents were asked the amount charged for connection of water for new members and the results shown in Table 4.14 shows that majority of the gravity water projects, 88 percent, pay above Ksh.10,000 as water connection fees, 8 percent pay between Ksh.5001 and Ksh.10,000 while only 6 percent pay less than Ksh.5000. A standard deviation of 0.741 showed fairly minimal dispersion of responses from different chairmen. In addition, 100% said that all community members paid fee to cater for water projects operations and maintenance. All respondents said they pay same amount irrespective of the amount used under the gravity water projects.

Water Charges Per-Month

The respondents for gravity water system were asked how much they pay for water monthly, and the results presented in Table 4.14 shows that, 25 percent of project charged between Ks.50 and Ksh.100, 25 percent between Ksh.101 and Ksh.150, 38 percent between Ksh.151 and Ksh.200, 8 percent charged over Ksh.200 while 5 percent did not charge, meaning they provide water free of charge. There seemed to be considerable variation of water fee charges since the standard variation was 1.150 and coefficient of variance was 48 percent meaning high dispersion of water fee charges from the average cost. This was attributed to the fact that each community water project decides how much to charge as water user fee. Table 4.14 shows that, in 78 percent of water project, the committees were responsible in setting the water user fees while in 22 percent the community decided.

Table 4.14 Water User Fee

	Frequency	percent	N Statistic	Mean Statistic	Mean Std. Error	Std. Deviation Statistic
Charges for New Members						
Less than 100	1	3				
3001-5000	1	3	40	5.79	.120	.741
5001-10,000	3	8				
More than 10,000	35	88				
Monthly Water Charges						
50-100	10	25				
101-150	10	25	40	2.36	.192	1.150
151-200	15	38				
More than 200	3	7				
No charges	2	5				
Responsibility to set the Fee	36	78	39	2.92	.043	.270
Water Committee	10	22				
Community						
Pay as You Fetch Fee						
Over Ksh 50	0	0				
Ksh. 30-49	0	0				
Ksh. 20-29	1	17	6	4.18	.043	.027
Ksh. 10-19	5	83				
Ksh.1-9	0	0				
Adequacy of water User fee						
Very Adequate	0	0				
Adequate	10	22.2				
I cant tell	4	8.9	45	2.47	.082	.919
Inadequate	28	62.2				
Very inadequate	3	6.7				
Fairness of Water User fee						
Very Fair	71	25				
Fair	107	37				
I cant tell	52	18	287	4.57	.054	.363
Unfair	34	12				
Very Unfair	23	8				

Pay-as-You-Fetch Charges

Pay-as-you-fetch mode of payment of water applies for borehole in most cases, unless it is a gravity water system service point, which was not present in Kieni Constituency. The respondents were asked how much they were paying for 20 liter water as they fetch. The results are presented in Table 4.14. The results showed that, 17 percent were charging between Ksh.20 and Ksh.29 per 20 liter of water while 83 percent were charging between Ksh.10 and Ksh.19 for the same. Majority of the chairmen felt that, the amount charged were not adequate with 93 percent and 0nly 7 percent felt the amount was adequate as shown in Table 4.14. All chairmen felt the amount charged was not adequate to cater for electricity or fuel used by the pumps and pay for the employee manning the water project.

4.6.5.4 Adequacy of Water User Fee

Chairpersons were asked to rate adequacy of water user fee in a five point scale where, very adequate=5, adequate=4, I can't tell=3, inadequate=2 and very inadequate=1. The results in Table 4.14 showed that, 6.7 percent of chairpersons were of the view that water user fee charged was very inadequate, 62.2 percent felt it was inadequate, 22.2 percent felt it was adequate and 8.9 percent could not tell. None said the water user fee was very adequate. The standard deviation of 0.919 depicted a moderate dispersion of opinion from chairperson on the adequacy of water user fee. These findings concurred with those of Whittington et al (2008) who established that rural communities in Boliva, Peru and Ghana were not collecting sufficient revenues to pay operation and maintenance costs and a significant minority were not collecting revenues at all, which led to breakdown and non-functionality of community water projects. A study by Gine and Perez-Foguet (2008) gave a recommendation for the failure of community revenues to generate sufficient funds, should chose technologies and set tariffs that are affordable and commensurate with their economic status.

4.6.5.5 Fairness of the Water User Fee

The water beneficiaries were asked whether the water user fee was fair. Their responses in Table 4.14 shows that majority of the water beneficiaries felt that water user fee was fair with 37 percent and 25 percent felt that the fee was very fair. 20 percent felt the fee was unfair.

The reasons given by those who felt that the fees were unfair and too high since the water projects did not supply adequate water. One respondent from Kieni West Sub County noted that:

> …we are charged every month for water that has not been supplied…(A Kieni West community water beneficiary)

Another beneficiary from Kieni East noted that:

> …the amount is unfair since the project committee leaders are not doing anything for the water project...(Kieni East community water beneficiary)

From the analysis of the few beneficiaries who felt that water fee charges were unfair, their main concern was the water project was not supplying enough water to warrant payments and poor leadership and management by community water committee.

4.6.6 Management of Water Projects

Management of community water projects was the mediating variable in the study. The level of management of water projects was assessed by combining and analysing the level of management effectiveness in the water project, level of community participation, level of financial management and ability to raise funds. These indicators were measured by a five point likert scale where very good/ very high carried 5 points, good/ high carried 4 points, fair was 3, poor/low was 2 and very poor/ very low was 1. The aggregate resulted in a composite mean for management of water projects as shown in Table 4.15.

Table 4.15 Management of Water Projects

	Frequency	Percent	N Statistic	Mean Statistic	Mean Std. Error	Std. Deviation Statistic
Effectiveness to run water projects						
Very good	0	0				
Good	0	0				
Fair	29	74.4	39	2.75	.058	.501
Poor	9	23.1				
Very poor	1	2.5				
Community Participation						
Very high	0	0				
High	3	7.7	38	3.03	.143	.362
Fair	34	87.2				
Low	2	5.1				
Very low	0	0				
Financial Management						
Very good	0	0				
Good	5	12.8	39	3.089	.077	.480
Fair	33	84.6				
Poor	0	0				
Very poor	1	2.6				
Ability to Raise Funds						
Very good	0	0				
Good	3	5.2	38	3.03	.070	.434
Fair	34	58.6				
Poor	0	0				
Very poor	1	1.7				
Composite Management variable				**2.975**	**.0599**	**.3741**

Community Committees' Management Effectiveness

Table 4.15 row one shows the effectiveness of management in running the community water projects. 2.5 percent felt the management was very poor, 23 percent felt it was poor, 74.4 percent thought it was fair while none felt it was good. A mean of 2.75 indicated that management was rated between poor and fair with very little variation as depicted by the standard deviation of 0.501.

These findings concurred with those of Binder (2008) which observed that, sustainability of water service delivery in rural environment is greatly affected by management's ability to run them effectively. He noted that, effective operation and maintenance (O & M) of rural water supply systems is crucial element for the sustainability of the water project. Community management of rural water supply systems on O & M is not successful, if financing resources are not available and frequent supports are not provided (Binder, 2008). He added that, budgeting sufficient funding for rural water supply systems was an important issue for sustainability and proper maintenance. The provision of an improved water supply was neither cost free nor sustainable unless costs are recovered. These costs comprise operation costs, repair and maintenance costs and replacement or rehabilitation costs (Briscoe & de Ferranti, 1998). World Bank evaluation report noted that, sustainability can only be ensured if tariffs generate enough resources to operate the system, finance the expansion of the service to new customers and ultimately replace the infrastructure after its useful life (Paraguay ICR, 1999). Community water management has the responsibility of setting a reasonable water user fee and creates systems for collections and accountability for the funds raised from water sales. Without such systems operations and maintenance will not possible hence leading to lack sustainability of community water projects. Management was an important factor in ensuring operations and maintenance which include repairs of water infrastructure raise funds for maintenance among others. Effective operations and maintenance was a key factor in ensuring sustainability of projects.

Community Participation

Community participation is an important management function in any community project. Respondents were asked to rate the degree of community participation on a five point scale with the highest being very high=5 and very low= 1. The results shown in Table 4.15 reveals that, 5 percent of chairmen felt that community participation was low, 87 percent felt it was fair, while around 8 percent felt it was high. Coefficient of variation of 12 percent indicated that this response was not very dispersed from the mean response. This meant that, majority of respondent had similar opinion that community was fairly involved in water projects. This finding

concurs with those of Nyong and Kanaroglou (1999) who documented that, lack of active participation leads to collapse of community projects. In addition, a study conducted by Vinya (2003) on the water and sanitation project embarked upon by the Sarvodaya Shramadana Movement, (Sri Lanka), indicated that sustainability of projects required "hardware" and "software". The "software" referred the high level of community participation and if combined with the 'hardware", that is, intensive training, standardization, and constant close monitoring at various levels, bring about success and sustainability of a community project. This study investigated how the "software" that is the community participation through capital contribution, that was equity finance, and payment of water usage fees, influenced the sustainability of the "hardware", that is the community water project.

Financial Management of Community Water Committees

The respondents were asked to rate financial skills of the water committee. The results shown in Table 4.61 indicates that, 2.6 percent of chairmen felt that their financial management skills were very poor, 85 percent felt it was fair while only 12.8 percent felt it was good. This showed that managers of community water project lacked adequate financial skills. as depicted by the mean of 3.089 which was rendered fair.

Management Ability to Raise Funds

The respondents were asked to rate the management ability in raising funds on a five point scale. The results shown in Table 4.62 indicated that 89.5 percent of chairpersons felt that the management ability in raising funds is fair, 2.6 percent felt it was very poor while 7.9 percent felt it was good. Coefficient of variation of 14 percent shows minimal dispersion of responses from the mean.

The resultant composite mean representing management ability to manage the water projects, community participation, financial skills and ability to raise funds was 2.975 with a standard deviation of 0.3741. This composite mean was used in assessing the mediating influence of management.

4.7 Correlation Analysis

This section covers correlation analysis between the dependent variable, that is, sustainability of community water projects and independent variables that is, equity financing, grant financing and water user fees of community water projects, as well as the mediating variable, management of community water projects. The method applied was Pearson Product Moment Correlation analysis was used to ascertain strength and direction of relationship. Shirley et al. (2005) indicated that for a weak correlation, "r" ranges from + 0.10 to + 0.29; in a moderate correlation, "r" ranges between + 0.30 and + 0.49; while in a strong correlation, "r" ranges from + 0.5 and + 1.0. Table 4.16 presents the results.

Table 4.16 Correlation Analysis

		Level of sustainability	Equity Financing	Grant Financing	Water User Fee	Management
Level of sustainability	Pearson Correlation	-	.296*	-.152	.356*	.846**
	Sig. (2-tailed)		.063	.517	.026	.000
	N	57	40	57	39	39
Equity Financing	Pearson Correlation	.296*	-	.270	-.131	-.238
	Sig. (2-tailed)	.063		.092	.433	.151
	N	40	40	40	38	38
Grant Financing	Pearson Correlation	-.152	.270	-	-.011	-.229
	Sig. (2-tailed)	.259	.092		.949	.161
	N	57	40	57	39	39
Water User Fee	Pearson Correlation	.356*	-.131	-.011	-	.734**
	Sig. (2-tailed)	.000b	.433	.949		.000
						39
	N	39	38	39	39	1
Management	Pearson Correlation	.846**	.238	-.229	.734**	-
	Sig. (2-tailed)	.000	.151	.161	.000	
	N	39	38	39	39	39

*. Correlation is significant at the 0.10 level (2-tailed).

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

4.7.1 Correlation between Equity Financing and Sustainability of Community Water Projects

Pearson Product Moment Correlation was used to ascertain strength and direction of relationship between equity financing and level of sustainability of community water projects and specifically gravity water projects where there was equity contribution from the community. Table 4.16 shows that r=0.296 depicting a moderate positive correlation which was also significant at 0.10 significant level. It was therefore concluded that there was a significant moderate relationship between equity financing and level of sustainability of community water projects. These findings concurred with those of Gow and Franken (1994) which found out that, a sure community participation in projects such as financial contribution enhances sustainability of benefits and accountability from community projects. Narayan (1995) and Oyesiku (1998) also emphasized that, without community contribution, there is little likelihood of sustainability being realized.

4.7.2 Correlation between Grant Financing and Sustainability of Water Project

Table 4.16 shows that Pearson Product Moment correlation coefficient between grant financing and sustainability of community projects was r = -0.152, depicting a weak negative correlation that was not significant at 0.10 significant level. It can therefore be concluded that there was a weak negative relationship between grant financing and level of sustainability of community water projects. Therefore, an increase in grants influences the levels of sustainability negatively. This finding concurred with those of Adam and Bevan (2006) and Nkusu (2004) who established that, grants lead to a Dutch Disease Syndrome. This is a situation created by large inflows of foreign aid results in lack of sustainability of development projects. The Dutch Disease Syndrome explains that, large windfalls such as aid have a negative effect on communities' productivity by impairing their competitiveness. The argument is that development aid might restrain progress of the community and undermine growth of the recipient of the aid (Adam and Bevan 2006; Nkusu 2004). In addition, this study finding also concurred with those of Foster (2003) and Young (2002) that, grants may have a negative impact on an organization's long-term sustainability because it creates "mission drift" as groups attempt to tailor themselves to each funder's

interests. This can be seen where donor account for their own funds as shown in Table 4.35.

4.7.3 Correlation between Water User Fee and Sustainability Community Water Projects

Table 4.16 shows that correlation coefficient r = .356*, depicting a moderate positive correlation. The correlation was also significant at 0.10 significant level. It was therefore concluded that there was a significant moderate positive relationship between water user fee and level of sustainability of community water projects. This meant that, an increase in water user fee will moderately improve sustainability of community water projects. For example, a 100 percent increase in water user fee will improve sustainability by 35.6 percent. These findings concurred with those of Brikke and Rojas (2001) that established that, recovery of, at least, the operation and maintenance cost through water tariffs was essential for the sustainability of water utilities, adequate system maintenance, and hence the provision of quality services.

4.7.4 Correlation between Management and Sustainability of Community Water Projects

Table 4.16 shows that, correlation coefficient between management and sustainability of community water projects r =0.846**, depicting a very strong and significant positive correlation at 0.10 significant level. It was therefore concluded, that there was a significant, strong and positive relationship between management and level of sustainability of community water projects. This meant that, an improvement in management such as improved ability to run the projects effectively, ability to raise funds, more involvement off community members, as well as improved financial skills; will significantly improve sustainability of community water projects. For example, a 100 percent improvement in the above indicators assessed will improve sustainability by 84.6 percent. These findings were in line with those of Kafakoma and Silungwe (2003), who submitted that, for a water project to be sustainable, a well-structured communication network with the community was required to ensure that beneficiaries were kept informed on matters affecting the project. Such actions lead

more support from the community especially in raising equity finance which has a positive relationship with sustainability of community water projects.

In addition, the findings concurred with those of Binder (2008) which observed that, sustainability of water service delivery is greatly affected by management's ability to run them effectively. World Bank evaluation report noted that, sustainability can only be ensured if there are proper systems to collect tariffs and other resources to operate the system, finance the expansion of the service to new customers and ultimately replace the infrastructure after its useful life (Paraguay ICR, 1999).

4.8 Test of Study Hypotheses and Regression Analysis

Analysis of Variance (ANOVA) was used to test hypotheses. The study calculated the ANOVA coefficient between the independent variables, that is, equity financing, grant financing, water user fee as well as capital structure and sustainability of the community water systems. The mediating effect of management was also analysed The significant level for testing the hypotheses was 0.10. According to Mense (2011), 90% level of confidence is adequate for interpreting hypothesis results.

Linear regression was used for modeling the relationship between independent variables and sustainability of community water projects.

4.8.1 Hypothesis 1: Equity Financing and Sustainability of Community Water Projects

Hypothesis one that the study tested was that, there is no significant relationship between equity financing and sustainability of the community water projects. Analysis of Variance (ANOVA) was used to test hypothesis. Table 4.17 shows analysis results of the relationship between equity financing and sustainability of the community water systems.

Table 4.17 ANOVA for Equity Financing

Sum of Squares		df	Mean Square	F	Sig.
Regression	1.387	1	1.387	3.662	.063[b]
Residual	14.388	38	.379		
Total	15.775	39			

a. Dependent Variable: Level of Sustainability
b. Predictors: (Constant), Equity Financing

From Table 4.17, F value was 3.662, and p= 0.063 (at 90% confidence level it was significant, since it was more than 0.10). This finding resulted in rejecting the null hypothesis one. Meaning that, at 90% confident interval, there was significant relationship between equity financing and sustainability of community water projects in Kieni Constituency, Nyeri County.

These findings concurred with the study of Kinzinger (2010) on self-funding as a guiding principle of project sustainability. He observed that, where it does not diminish mission, community or self-funding, if complemented by organization accountability, has a net quantitative benefit on project sustainability and a net qualitative benefit on persons impacted by the project when community contribute resources to a projects. This seemed to be true since the influence of equity financing had significant effect on levels of sustainability.

Regression model one was represented as: $\boldsymbol{Y_1=\alpha_{01}+\alpha_{11}X_1+e.}$Table 4.18 shows the model summary of analysis of equity financing and sustainability of community water projects.

Table 4.18 Regression Coefficients of Equity and Sustainability of Water Projects

	Unstandardized Coefficient				
	B	Std. Error	Sig	R square	Std. Error of the Estimate
(Constant)	1.557	.669	.025	.088	.615
Equity Financing	.340	.178	.063		

Table 4.18 shows regression analysis results. Based on Field (2009), Y intercept was 1.557 while coefficient of the independent variable (equity financing X_1) was 0.34 and the standard error is 0.615 from the model summary in Table 4.23. Therefore the first model of the study $\boldsymbol{Y_1=\alpha_{01}+\alpha_{11}X_1+e}$ was represented as:- $\mathbf{Y=1.557 + 0.340X_1}$

The model can be interpreted to mean that, without any equity financing, the level of sustainability will be 1.557. From the scale that used to measure sustainability level 1.557 falls in the category of functioning with many problems (with 5=very sustainable, 4= Sustainable with little problems, 3= neutral, 2= sustainable many problems and 1=not sustainable at all).

The coefficient of equity financing (X_1) of 0.34 refers to the elasticity of sustainability of community water projects due to changes in equity financing. The coefficient of 0.34 implies that, if equity finance increases by 100 percent, sustainability will improve by 34 percent. According to Field (2009), the standard error of 0.615 meant that, if the model was to be replicated in a different project, its accuracy will vary by 61.5%.

Table 4.18 indicates R Square=0.088 which indicated that equity financing account for only 8.8% of the variation in levels of sustainability (Field, 2009). This meant that, there might be many factors that can explain variation in levels of sustainability, this model, which includes only equity financing, can explain approximately 8.80% of it. Hence, 91.2% of the variation in levels of sustainability cannot be explained by equity financing. Therefore, other variables could be having more influence on sustainability. Such variables include water policy context; water institutional

arrangements; financial and economic issues in water management; community and social aspects; technology and the natural environment; spare parts supply for water systems; maintenance systems; and monitoring as among others (Harvey & Reed (2007), Adida (2012), Beyene (2012), Musonda (2004), Abrams (1998), Mukherjee & Van Wijk (2002), and Shaw (2012))

4.8.2Hypothesis 2: Grant Financing and Sustainability of Community Water Projects

The study used ANOVA to test the hypothesis two, that is, there was no significant difference between grant financing and levels of sustainability of community water projects in Kieni Constituency, Nyeri County and the results are shown in Table 4.19.

Table 4.19 ANOVA of Grant Financing and Level of Sustainability of Community Water Projects

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.846	1	.846	1.303	.259[b]
	Residual	35.715	55	.649		
	Total	36.561	56			

a. Dependent Variable: Level of sustainability
b. Predictors: (Constant), Rate of adequacy of grant financing

Table 4.19 shows that, the calculated F was 1.303, which was not significant at p =0.259 (because the value in the column labeled Sig. was more than 0.10) (Field, 2009). Therefore, there was failure to reject the null hypothesis, hence it was concluded that, there was no significant relationship between grant financing and sustainability of community water projects. Therefore, increase or decrease of grant financing in a community water project did not significantly influence sustainability of community water projects.

Linear regression was used to model the relationship between grant financing and sustainability of water projects. The results are displayed in Table 4.20.

Table 4.20 Regression Coefficient Summary for Grant Financing

Model		Unstandardized Coefficients		Sig.	R square	Std. Error of the Estimate
		B	Std. Error			
1	(Constant)	3.142	.356	.000	0.023	.806
	Adequacy of grant financing	-.136	.119	.259		

Table 4.20 shows the regression coefficients between grant financing and sustainability of community water projects. Based Field (2009) Y intercept was 3.142 while coefficient of the independent variable was -0.136 and the standard error is 0.806 from the model summary in Table 4.5. Therefore the second model of the study $\boldsymbol{Y_2=\alpha_{02}+\alpha_{12}X_{2+}\ e}$ was represented as

$$\mathbf{Y=3.142-0.136X_2}$$

The Y intercept=3.142, was interpreted to mean that, without any grant financing, the level of sustainability will be 3.142. From the scale that used to measure sustainability level 3.142 leans towards the category of functioning with few problems (with 5=fully functioning, 4= functioning with few problems, 3= I can't tell, 2= functioning with many problems and 1=not functioning at all). This meant that, without grant finance water systems will still function albeit with few problems.

The coefficient of grant financing X_1 was -0.136. Negative coefficient of grant financing (X_1) of 0.136 implied that, there was weak negative relationship between grant financing and sustainability of community water projects. It was concluded that, a 100 percent increase in grant financing will decrease sustainability levels by 13.6 percent.

The standard error of 0.806 meant that, if the model was to be replicated in a different project, its accuracy will vary by 80.6%, according to Field (2009). This therefore meant the model was not very good for replication in a different area since its

accuracy will vary by 80.6 percent. This model can only be applied in Kieni Constituency.

Table 4.20 shows that, the R Square=0.023 in the regression model summary indicated that grant financing accounted for 2.3% of the variation in levels of sustainability (Field, 2009). There might be other factors that should explain variation in levels of sustainability, this model, which included only grant financing. This meant that 97.7% of the variation in levels of sustainability could not be explained by grant financing. The regression model of grant financing did not conclusively predict the levels of sustainability significantly well. Therefore, there must be other variables that had an influence in the level of sustainability which could be equity financing, management and managerial factors, availability of spare parts, environmental factors, social factors such as conflict, and water policies among others.

These results enriched Pratt (2002) and Burd (2009) who documented that, organizations that pursue project-based funding may receive support from a variety of donors, all of whom may have different desired outcomes. Adhering to the expectations of too many masters could dilute an organization's operations there by affecting project sustainability. Besides, community water project committee in most cases were not involved in accountability of the project resources except for what the community gave as equity for construction, connection fee and water user fee which were normally inadequate and challenging to mobilize and collect.

4.8.3 Hypothesis 4: Water User Fee and Sustainability of Community Water Projects

To test hypothesis four of the study Analysis of Variance (ANOVA) was used while linear regression analysis was used for regression analysis and the results are presented in Table 4.21 and Table 4.22 respectively.

Table 4.21: ANOVA between Water User Fee and Level of Sustainability

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	3.109	1	3.109	16.791	.000[b]
Residual	6.851	37	.185		
Total	9.961	38			

Table 4.21 shows ANOVA between water user fee and levels of sustainability. F was 16.791, which was significant at p =0.00 (because the value in the column labeled Sig. was less than 0.10) (Field, 2009). Therefore, the null hypothesis was rejected, meaning there was significant relationship between water user fee and sustainability of community water projects in Kieni Constituency, Nyeri County Kenya. In other words, the regression model of water user fee, conclusively and significantly predict the levels of sustainability of community water projects. These findings concurred with those of Brikke and Rojas (2001) that established that, recovery of at least the operation and maintenance cost through water tariffs was essential for the sustainability of water utilities, adequate system maintenance, and hence the provision of quality services. These findings revealed that water tariff was an important factor that affected sustainability of water projects.

Linear regression was used to model the relationship between water user fee and sustainability of water projects. The results are displayed in Table 4.22.

Table 4.22 Regression Coefficient Summary for Water User Fee

Model	Unstandardized Coefficients		Sig.	R square	Std. Error of the Estimate
	B	Std. Error			
(Constant)	3.142	.378	.000	0.312	.4303
Water User fee	.560	.137	.000		

Table 4.22 shows the regression coefficients between water user fee and sustainability of community water projects. Based Field (2009) Y intercept was 3.142 while coefficient of the independent variable was 0.56 and the standard error was 0.4303 from the model summary in Table 4.5. Therefore the second model of the study $Y_4=\alpha_{04}+\alpha_{14}X_{4+}\ e$ was represented as

$Y=3.142+0.56X_4$

The Y intercept=3.142, was interpreted to mean that, without any water user fee, the level of sustainability will be 3.142. From the scale that used to measure sustainability level 3.142 leans towards the category of functioning with few problems (with 5=Very sustainable, 4= sustainable with few problems, 3= neutral, 2= sustainable with many problems and 1=not sustainable at all). This meant that, without water user fee, water systems will still function albeit with few problems.

The coefficient of water user fee X_4 was 0.56. The coefficient of water user fee (X_4) of 0.56 implied that, there was strong positive relationship between grant financing and sustainability of community water projects. It was concluded that, a 100 percent increase in grant financing will increase sustainability levels by 56 percent.

The standard error of 0.4303 meant that, if the model was to be replicated in a different project, its accuracy will vary by 43.3%, according to Field (2009). This therefore meant the model was not very good for replication in a different area since its accuracy will vary by 43.3 percent. This model can only be applied in Kieni Constituency.

Table 4.22 shows that, the R Square=0.312 in the regression model summary indicated that water user fee accounted for 31.2% of the variation in levels of sustainability (Field, 2009). This meant that 68.8% of the variation in levels of sustainability could not be explained by grant financing. The regression model of grant financing did, to a small extent, conclusively predict the levels of sustainability significantly well.

4.8.4 Hypothesis 5: Capital Structure and Sustainability of Community water projects

This section covers test of hypothesis five, that is, there is no significant relationship between capital structure and sustainability of community water projects.Capital structure was represented by combination of equity financing, grant financing and water user fee. Sustainability was assessed based on level of functionality over time, functionality of water systems and adequacy of water provision by community water projects. All variables were in a 5 point scale with highest value being 5 and lowest 1. The methods of analysis were analysis of variance and regression analysis.

To test hypothesis five of the study, the study used ANOVA. The results are shown in Table 4.23.

Table 4.23: ANOVA of Capital Structure and Levels of Sustainability

Model		Sum of Squares	Df	Mean Square	F	Sig.	R square	**Std. Error**
1	Regression	.146	1	.146	.380	.540[b]	.11	.620
	Residual	21.174	55	.385				
	Total	21.321	56					

a. Dependent Variable: Level of sustainability
b. Predictors: (Constant): Capital structure

From Table 4.23, the calculated F was 0.380, which was not significant at p =0.540 (because the value in the column labeled Sig. was more than 0.10) (Field, 2009). Therefore, the null hypothesis five was accepted, hence it was concluded that, there is no significant relationship between capital structure and levels of sustainability of community water projects in Kieni Constituency, Nyeri County, Kenya.

Table 4.23 also shows that, the R Square=0.11 indicating that capital structure accounted for 11% of the variation in levels of sustainability (Field, 2009). This meant that 89% of the variation in levels of sustainability could not be explained by capital structure.

4.8.4.1Regression Modeling of Capital Structure and Levels of Sustainability

Table 4.24 gives the regression coefficient between capital structure and levels of sustainability.

Table 4.24 Regression Analysis of Capital Structure and Sustainability

Model		Unstandardized Coefficients		Standardized Coefficients	Sig.	Collinearity Statistics	
		B	Std. Error	Beta		Tolerance	VIF
1	Constant	2.984	.603		.000		
	Capitalstructure	-.112	.181	-.087	.540	1.000	1.000

a. Dependent Variable: sustainability (90% Confidence Level)

Based on Field (2009), Y intercept for the model was 2.984 while coefficient of the capital Structure (X_5) was -0.112. Therefore the third model of the study $\boldsymbol{Y_5=\alpha_{05}+\alpha_{15}X_5+e_5}$was derived as:

$$\mathbf{Y=2.556 - 0.112X_5}$$

The model was interpreted to mean that, without capital structure, the level of sustainability will be 2.556. From the five point scale that used to measure sustainability level 2.556 falls between neutral and functioning with many problems (5=fully functioning, 4= functioning with little problems, 3= neutral, 2= functioning with many problems and 1=not functioning at all). Therefore, without capital structure community water projects will operate though with many problems. In addition, the model reveals that, capital structure alteration will affect levels of sustainability by 11.2 percent.

4.8.5 Hypothesis 6:Mediation Effect of Management on Relationship between Capital Structure and Sustainability of Community Water Projects

This section covers analysis of mediating effect of community water projects management on relationship between capital structure and sustainability of community water projects. Capital structure is represented by adequacy of equity financing, grant financing and water user fee. Sustainability was assessed based on level of functionality over time. Management is represented by effectiveness of management committee in running water projects, financial management, community participation and ability to raise funds. All variables were in a 5 point scale with highest value being 5 and lowest 1. The methods of analysis included, analysis of variance and regression analysis.

A mediation model is one that seeks to identify and explain the mechanism or process that underlies an observed relationship between an independent variable and a dependent variable via the inclusion of a third hypothetical variable, known as a mediator variable (also a mediating variable, intermediary variable, or intervening variable) (MacKinnon, 2008).

Mediation analyses are employed to understand a known relationship by exploring the underlying mechanism or process by which capital structure influences sustainability of community water projects through a mediator variable community water management.

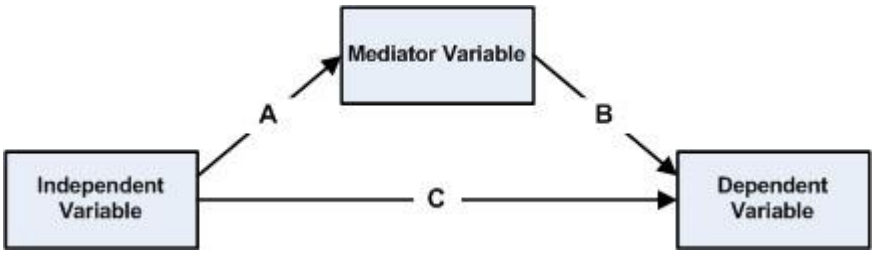


Figure 6: Mediation Effects

Baron and Kenny (1986) laid out several requirements that must be met to form a true mediation relationship. They are outlined below using a real-world example. Figure

6shows for a visual representation of the overall mediating relationship to be explained.

Step 1: Regress the dependent variable on the independent variable to confirm that the independent variable is a significant predictor of the dependent variable (α_{51} is significant). This was found out to be insignificant, that is, there is no significant relationship between capital structure and sustainability of community water projects (see section 4.8.4)

Step 2: Regress the mediator on the independent variable to confirm that the independent variable is a significant predictor of the mediator. If the mediator is not associated with the independent variable, then it couldn't possibly mediate anything. α_{61} is significant

Step 3: Regress the dependent variable on both the mediator and independent variable to confirm that the mediator is a significant predictor of the dependent variable, and the previously significant independent variable in Step 1 is now greatly reduced, if not non-significant.

(α_{72} is significant, α_{51} should be smaller in absolute value than the original mediation influence(α_{51} above)

ANOVA and linear regression analysis were used to test hypothesis six, that is, there was no significant mediating influence of management on the relationship between capital structure and sustainability of the community water projects. The results of test are shown in Table 4.25 and Table 4.26.

Table 4.25: Test of Hypothesis Six

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.	R square	Std. Error
1	Regression	7.208	2	3.604	47.141	.000[b]	.724	.2765
	Residual	2.752	36	.076				
	Total	9.961	38					

a. Dependent Variable: sustainability

b. Predictors: (Constant), management, Capital Structure

From Table 4.25, the calculated F was 47.141, which was very significant at p =0.000 (because the value in the column labeled Sig. is less than 0.10) (Field, 2009). Therefore, null hypothesis was rejected, hence it was concluded that, there was significant mediating influence of management on the relationship between capital structure and sustainability of the community water projects in Kieni Constituency, Nyeri County, Kenya. This meant that, management plays key role in mediating relationship between capital structure and sustainability of community water projects.

Table 4.25 shows the R Square changing to 0.724 from 0.11 (see Table 4.23) after the mediating effect of management variable. This meant that, the influence of capital structure on sustainability of community water project significantly improved from 11 percent to 72.4 percent. In other words, due to the mediating effect of management of community water projects, 72.4 percent of changes in sustainability can be explained by capital structure which is an improvement from only 1.18 percent without intervening effect of management.

Table 4.26 gives the regression analysis between capital structure and levels of sustainability mediated by community water projects management.

Table 4.26 Mediating Effect of Management

Model	Unstandardized Coefficients		Standardized Coefficients	Sig.	90.0% Confidence Interval for B		Collinearity Statistics		R square
	B	Std. Error	Beta		Lower Bound	Upper Bound	Tolerance	VIF	
1 (Constant)	2.296	.473		.000	5.497	7.096			
CapitalStructure	-.111	.112	-.087	.331	-.300	.079	.978	1.023	.724
Management	1.140	.121	.833	.000	-1.345	-.936	.978	1.023	

a. Dependent Variable: sustainability

Table 4.26 shows that, the standardized Beta statistic form management of community water projects increased from 0.083 to a high significant value of 0.833 depicting a significant improvement on influence of capital structure on sustainability

of community water projects due to mediation effect of management of water projects. Based on Field (2009), Y intercept for the model was 2.296 while coefficient of the independent variables were -0.111 for capital structure (X_5) and 1.140 for management (X_6). Therefore the sixth model of the study $\boldsymbol{Y_6=\alpha_{06}+\alpha_{16}X_5+\alpha_{26}X_6+e}$ was derived as:

$$\mathbf{Y=2.296-0.111X_5+1.14X_6}$$

The model was interpreted to mean that, without capital structure, the level of sustainability will be 2.296. From the five point scale that used to measure sustainability level 2.296, falls in sustainable but with many problems (5=sustainable, 4= sustainable with little problems, 3= neutral, 2= sustainable with many problems and 1=not sustainable at all). Therefore, without capital structure community water projects were sustainable albeit with many problems.

In section 4.8.4, the study found out that there was no significant relationship between capital structure and sustainability of community water projects in Kieni Constituency, Nyeri County. However, when the relationship was mediated by management, the relationship becomes significant. This study concurred with those of Binder (2008), who found out that, effective management in operation and maintenance (O & M) of rural water supply systems is crucial element for the sustainability of the water project. Community management of rural water supply systems on O & M is not successful, if financing resources are not available and frequent supports are not provided which is a key management function (Binder, 2008).

In addition, World Bank evaluation report noted that sustainability can only be ensured if tariffs generate enough resources to operate the system, finance the expansion of the service to new customers and ultimately replace the infrastructure after its useful life (Paraguay ICR, 1999). This management function ultimately intervened in the relationship between capital structure and sustainability of community water projects. Community water management also had the responsibility of running water projects effectively, involve community members, raise adequate

funds and creates systems for collections and accountability for the funds raised from water sales. Without such systems operations and maintenance will not be possible hence leading to lack sustainability of community water projects. Therefore, management influenced how different sources of finance were raised, which had a bearing on sustainability of community water projects.

Kafakoma and Silungwe (2003) further submitted that for a water project to be sustainable, a well-structured involvement and communication network was required to ensure that beneficiaries were kept informed on matters affecting the project, transparency and accountability and have the ability to run the projects successfully. Such actions would lead to more support from the community especially in raising equity finance which had a positive relationship with sustainability of community water projects.

CHAPTER FIVE
SUMMARY OF THE MAJOR FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter covers summary of the major findings, conclusions and recommendations. The summary for each objective and hypothesis were presented. The conclusions in this study were based on the findings, analysis, interpretations and discussions in the study. Based on the conclusions made, recommendations were derived.

5.2 Summary of the Findings

The study found out that, most of the water projects were gravity water system which had 70 percent representation, 11 percent were boreholes and 19 percent were dams and water pans. The expenditure on all community water projects in Kieni constituency was Ksh.854 million from the 57 water projects. The projects' costs varied largely from one project to another. These variations were brought about by the type and design of the project, which required different amount of money to construct, and the management's aggressiveness in initiating bigger community water projects. All beneficiaries required water for domestic purposes, livestock and irrigation of crops either for commercial purposes or subsistence due to inadequate rainfall in the area.

Almost all chairpersons were male and only 9 percent were female. This depicted huge gender disparity in leadership of community water projects. This was contrary to beneficiaries who were mostly women. In addition, majority of chairpersons were inexperienced. All chairpersons had basic education but none had a degree or higher qualification. This showed a modest education level for a chairperson of a project that is worth millions of shillings and serves many people.

5.2.1 Sustainability of Community Water Projects

Sustainability of community water projects was assessed by combining aggregates of functionality of the water system, status of water project infrastructure and adequacy of water provided by water systems. The study found out that, level of functionality had a mean of 2.75, indicating the level of functionality was skewed towards functioning with many problems. A standard deviation of 0.808 showed that most projects had similar functionality status, that is, they were functioning with many problems. This study also found out that 75 percent of boreholes were non-functional.

The second indicator for sustainability was status of water project infrastructure. The analysed water projects infrastructure were, water pumps, pipes, tanks, taps, impounding ware, spill way, cattle troughs and other facilities. The results revealed that, the mean was 2.5 for all the water project infrastructure. This meant that, the community water projects infrastructure status was in good condition.

The third indicator for sustainability of community water project was adequacy of water provided by the projects. Adequacy of water provided was assessed by five point likert scale which was in the water beneficiaries' questionnaires. Table 4.10 shows that the mean was 2.13 meaning, majority of water projects were not supplying adequate water. This revealed that, most people in Kieni Constituency lacked adequate water. These responses had a standard deviation of 1.008 and a coefficient of variation of 45 percent which implied that, responses from water beneficiaries were considerably spread away from the mean, which meant some water projects were supplying adequate water to beneficiaries but majority supplied inadequate water. Given the status and functionality of water project infrastructure that was established to be above average, this means that lack of adequate water was not as a result of poor water project infrastructure. The projects infrastructures were in good condition but supplies inadequate water.

The composite mean of sustainability levels was 2.727. This meant that, most water projects were sustainable since the mean was above neutral and skewed towards sustainability albeit with few problems.

5.2.2 Equity Financing and Sustainability of Community Water Projects

Equity financing was the first independent variable of the study. Equity finance in the study was assessed by analysising community contribution in form of cash contribution and labour contribution.

On community cash contribution, 70 percent of all the projects community contributed their own funds for the water projects. The 70 percent were all gravity water systems and the other 30 percent of the projects where community did not give cash as their equity contribution were dams and boreholes. The Government fully financed the construction of water dams and boreholes without any community contribution.

The amount of cash contributed by the community had a mean of Ksh.9,357 and a standard deviation of Ksh.325 which meant that the amount of cash contributed by water beneficiaries were not very different hence most members contributed amounts that were not very different from each other. This amount contributed by communities for water projects was low. In addition in 97.5 percent community water projects, water beneficiaries did not pay the entire amount required while in only 2.5 percent all community members paid the required amount of cash as their equity contribution. The reasons for not paying were poverty among community members 12.5 percent, outright nonpayment 10 percent, unreliable income of the community members 55 percent, lack of goodwill 7.5 percent, and the area was very wide hence difficult to collect the money 12.5, and conflicts 2.5 percent. The study also found out that, the water management committees did not have any way of compelling community members to make payment for construction after water is connected. They can only apply social pressure in meetings.

Labour contribution was calculated by number of days worked. The results showed that community members provided labour for gravity water projects only. The mean number of days worked was 369 days. This translated to provision of labour by community members for a whole year.

The adequacy of cash contributed by community members was an indicator for equity financing. The results showed that, water beneficiaries' contribution in water projects

was inadequate, that is, 70 percent felt community contribution was inadequate, 2.5 percent felt it was very inadequate, 2.5 percent felt it was adequate and 25 percent could not tell. Community did not contribute adequate funds for the construction of the community water projects.

The study established that, Pearson Product Moment Correlation Coefficient (r)= 0.296 depicting a moderate positive correlation which was also significant at 0.10 significant level.

Analysis of Variance (ANOVA) was used to test hypothesis one of the study. The results that, F value was 3.662 which was significant at α =0.10 since p=0.063. This finding resulted in rejecting the null hypothesis one. Meaning that, at 90% confident interval, there was significant relationship between equity financing and sustainability of community water projects in Kieni Constituency, Nyeri County.

The regression analysis resulted in study model1 $\mathbf{Y=1.557 + 0.340X_1}$. The resultant R Square=0.088 indicated that equity financing accounted for only 8.8% of the variation in levels of sustainability. Hence, 91.2% of the variation in levels of sustainability could not be explained by equity financing.

5.2.3 Grant Financing and Sustainability of Community Water Projects

Grant financing was the second study variable under objective two of the study. Grant financing sources were funds from Ministry of Water, National Arid Lands Authority, foreign donors and Constituency Development Funds.

The study found out that, all community water projects received grants from the Government for construction of the water projects. The average amount received was Ksh.9.61million with a standard deviation of 5.766. In terms of accessibility of Ministry of Water Funds, 3.5 percent of the chairmen felt that Ministry of Water grants are very accessible, 35 percent felt it was accessible, 19 percent felt it was inaccessible and 3.5 percent felt it was very accessible. 38 percent could not tell. The mean of 2.84 showed that majority of the water chairperson felt that Ministry of water grants was inaccessible. The reasons given for inaccessibility included the funds have to be approved by parliament, it is requested through proposal writing which majority

did not know how to prepare, lack of personnel to provide information and advice, and takes time to acquire it besides being free funds.

On the adequacy of Ministry of Water Grants only 15.8 percent of all chairperson felt that grants from the Ministry of Water were inadequate, 35 percent felt it was adequate, 5 percent felt it was very adequate while another 43.9 percent did not have an opinion. A mean of 3.30 indicated that majority of chairmen could not tell if Ministry of water grants were adequate or not and their responses varied by 24 percent. This was attributed to the fact that they were not accountable for the Ministry of Water grants but the District Water Officers accounted for the Ministry of Water grants in 96 percent of the community water projects. Further, 98 percent of water projects did not receive money for operations and maintenance while only 2 percent received. The one project that received money for operation and maintenance was from Kieni West, where Tana Water had seconded a manager to professionally run the community water project. The manager felt that government grants for operation and maintenance were not enough.

The study found out that, 70 percent of community water projects received donor funds for construction of community water projects while 30 percent did not. The study also established that only gravity water projects received donor funds for construction. Boreholes and dams did not receive any funds from donors. On adequacy of donor grants, only 7.5 percent of community water projects that received donor funds for construction felt that donor fund were very adequate, 2.5 percent felt the funds were adequate and 12 percent felt it was inadequate. On accountability of donor funds, only in 8 percent of the community water projects the project committees accounted for donor funds, in 3 percent was accounted by District Water Officer while in majority, 89 percent of water projects receiving donor grants, donors themselves accounted for the money they grant. This meant that community did not have a say on how donor funds were used. As for operation and maintenance, only 2 percent of all water projects received funds for operational and maintenance.

The results of the study established that 60 percent of gravity water projects received grants from CDF kitty. All the other projects did not receive any funds from CDF. The amount received ranged between Ksh.200,000 and Ksh.3million. Total sum received was Ksh.22.75 million with a mean of approximately Ksh.948,000 with a standard deviation of Ksh.687,700 meaning that, there was very high dispersal of the amount received by projects from the mean amount.

In addition, 45 percent of all projects received grants from National Arid Lands Authority (NALA). The amount granted had a range of Ksh.59,800,000 with a minimum amount of Ksh.200,000 and maximum of 60,000,000. The mean of the grant was Ksh. 7,965,000 with a standard deviation of Ksh.1,438,224. This depicted huge variation of grants between projects. This could be as a result of water project committee being aggressive in soliciting for funds or policy of National Arid Lands Authority to fund specific projects.

The calculated Pearson Product Moment correlation coefficient (r) = -0.152, depicted a weak negative correlation that was not significant at 0.10 significant level between grant financing and sustainability of community water projects. Therefore, there was a weak inverse relationship between grant financing and level of sustainability of community water projects.

The study used ANOVA to test the hypothesis two. The resultant calculated F was 1.303, which was not significant at p =0.259 (because the value in the column labeled Sig. was more than 0.10) (Field, 2009). Therefore, there was failure to reject the null hypothesis, hence it was concluded that, there was no significant relationship between grant financing and sustainability of community water projects. The second model of the study $\boldsymbol{Y_2=\alpha_{02}+\alpha_{12}X_{2+}\ e}$ was represented as $\mathbf{Y=3.142-\ 0.136X_2}$. The resultant R Square=0.023 in the regression model summary indicated that grant financing accounted for 2.3% of the variation in levels of sustainability. This meant that 97.7% of the variation in levels of sustainability could not be explained by grant financing.

5.2.4 Debt Financing and Sustainability of Community Water Projects

The study established that, all the projects had not obtained a loan from any bank. The reasons was that, they were afraid they may not be able to repay the loans, their collection as water user fees may not be able to service the loan or income inconsistency, loans are expensive, lack of knowledge as to how to obtain the loans.

Interview with bank managers revealed that community projects do not seek for debt financing. All bank managers were cautious in advancing loans to community based projects. The reason was, it was difficult to hold the community to account, poor management systems that changes leadership often and poor financial performances, that is, community projects do not generate sufficient revenues or lack of accountability by their leaders. In addition, most bank managers felt that most community projects are political in nature and banks avoid political risk. However, on funding water projects, most bank managers revealed they can advance a loan to a water projects that if the community water projects bank with them, exhibit proper financial performance over reasonable time.

However, advantages of debt were not revealed. Such advantages may include provision of low cost monitoring for projects and additional funding of community water project which were inadequate.

5.2.5 Water User Fee and Sustainability of Community Water Projects

Objective four of the study sought to establish the influence of the water user fees on sustainability of community water projects. Water user fee was analysed by assessing water connection fees, charges for water consumption and adequacy of water user fee.

On the amount charged for connection of water for new members, results showed that majority of the gravity water projects, 88 percent, pay above Ksh.10,000 as water connection fees, 8 percent pay between Ksh.5001 and Ksh.10,000 while only 6 percent pay less than Ksh.5000. A standard deviation of 0.741 showed fairly minimal dispersion of responses from different chairmen. In addition, 100% said that all community members paid fee to cater for water projects operations and maintenance. All respondents said they pay same amount irrespective of the amount used under the gravity water projects.

On the cost of monthly water charges, 25 percent of project charged between Ks.50 and Ksh.100, 25 percent between Ksh.101 and Ksh.150, 38 percent between Ksh.151 and Ksh.200, 8 percent charged over Ksh.200 while 5 percent did not charge, meaning they provide water free of charge. There was considerable variation of water fee charges since the standard variation was 1.150 and coefficient of variance was 48 percent meaning high dispersion of water fee charges from the average cost. This was attributed to the fact that each community water project decides how much to charge as water user fee. Further, in 78 percent of water project, the committees were responsible in setting the water user fees while in 22 percent the community decided.

Pay-as-you-fetch mode of payment of water applied for borehole in most cases, unless it was a gravity water system service point, which was not present in Kieni Constituency. The cost for 20 liter container water as they fetch was that, 17 percent were charging between Ksh.20 and Ksh.29 per 20 liter of water while 83 percent were charging between Ksh.10 and Ksh.19 for the same. Majority of the chairmen felt that, the amount charged were not adequate with 93 percent and only 7 percent felt the amount was adequate. All chairmen felt the amount charged was not adequate to cater for electricity or fuel used by the pumps and pay for the employee manning the water project.

On adequacy of water user fee, the results showed that, 6.7 percent of chairpersons were of the view that water user fee charged was very inadequate, 62.2 percent felt it was inadequate, 22.2 percent felt it was adequate and 8.9 percent could not tell. None said the water user fee was very adequate. The standard deviation of 0.919 depicted a moderate dispersion of opinion from chairperson on the adequacy of water user fee. On fairness of the water user fee, the results showed that ,majority .of the water beneficiaries felt that water user fee was fair with 37 percent and 25 percent felt that the fee was very fair. 20 percent felt the fee was unfair. The reasons given by those who felt that the fees were unfair and too high since the water projects did not supply adequate water.

Pearson Product Moment Correlation coefficient $r = .356^{*}$, depicted a moderate positive correlation between water user fee and sustainability of community water projects. The correlation was also significant at 0.10 significant level. It was therefore

concluded that there was a significant moderate positive relationship between water user fee and level of sustainability of community water projects. This meant that, a 100 percent increase in water user fee will improve sustainability by 35.6 percent.

To test hypothesis four of the study Analysis of Variance (ANOVA) was used while linear regression analysis was used for regression analysis. The results showed ANOVA between water user fee and levels of sustainability, F =16.791, which was significant at p =0.00. Therefore, the null hypothesis four was rejected, meaning there was significant relationship between water user fee and sustainability of community water projects in Kieni Constituency, Nyeri County Kenya.

The regression coefficients between water user fee and sustainability of community water projects resulted in the second model of the study $\boldsymbol{Y_4=\alpha_{04}+\alpha_{14}X_{4+}\ e}$ was represented as $\mathbf{Y=3.142+0.56X_4}$.

Therefore a, a 100 percent increase in grant financing will increase sustainability levels by 56 percent. The R Square=0.312 in the regression model summary indicated that water user fee accounted for 31.2% of the variation in levels of sustainability (Field, 2009). This meant that 68.8% of the variation in levels of sustainability could not be explained by grant financing.

5.2.6 Effect of Capital Structure on Sustainability of Community Water Projects

Hypothesis five was stated as; there was no significant relationship between capital structure and sustainability of community water projects. Capital structure was represented by combination of equity financing, grant financing and water user fee. Sustainability was assessed based on level of functionality over time, functionality of water systems and adequacy of water provision by community water projects. The calculated F statistic was 0.380, which was not significant at p =0.540. Therefore, the null hypothesis five was accepted; hence, there is no significant relationship between capital structure and levels of sustainability of community water projects in Kieni Constituency, Nyeri County, Kenya.

The regression analysis results between capital structure and levels of sustainability, Y intercept for the model was 2.984 while coefficient of the capital Structure (X_5) was

-0.112. Therefore the third model of the study $Y_5=\alpha_{05}+\alpha_{15}X_5 +e$ was derived as: $\mathbf{Y=2.556 - 0.112X_5}$

5.2.7 Mediating Influence of Management on Relationship between Capital Structure and Sustainability of Community Water Projects

Management of community water projects was the mediating variable in the study. The level of management of water projects was assessed by analysing the level of management effectiveness in the water project, level of community participation, level of financial management and ability to raise funds. The aggregate resulted in a composite mean for management of water projects.

The study established that, 2.6 percent felt the management was very poor in management of the water projects, 23 percent felt it was poor, 74.4 percent thought it was fair while none felt it was good. A mean of 2.75 indicated that management was rated between poor and fair with very little variation as depicted by the standard deviation of 0.501. On community participation, 5 percent of chairmen felt that community participation was low, 87 percent felt it was fair, while around 8 percent felt it was high. Coefficient of variation of 12 percent indicated that this response was not very dispersed from the mean response. On financial skills of the water committee the results indicated that, 2.6 percent of chairmen felt that their financial management skills were very poor, 85 percent felt it was fair while only 12.8 percent felt it was good. This showed that managers of community water project lacked adequate financial skills. as depicted by the mean of 3.089 which was rendered fair. The respondents were asked to rate the management ability in raising funds on a five point scale. The results shown in Table 4.62 indicated that 89.5 percent of chairpersons felt that the management ability in raising funds is fair, 2.6 percent felt it was very poor while 7.9 percent felt it was good. Coefficient of variation of 14 percent shows minimal dispersion of responses from the mean.

The resultant composite mean representing management ability to manage the water projects, community participation, financial skills and ability to raise funds was 2.975 with a standard deviation of 0.3741. This composite mean was used in assessing the mediating influence of management.

ANOVA and regression analysis were used to test the mediating influence of management on the relationship between capital structure and sustainability of community water projects. The result indicated that, the calculated F was 47.141, which was very significant at p =0.000 Therefore, null hypothesis was rejected, hence it was concluded that, there was significant intervening effect of management on the relationship between capital structure and sustainability of the community water projects in Kieni Constituency, Nyeri County, Kenya. The R Square changed to 0.724 from 0.011 (influence of capital structure on sustainability) after the mediating effect of management variable. This meant that, the influence of capital structure on sustainability of community water project significantly improved from 1.1 percent to 72.4 percent. In other words, due to the mediating effect of management of community water projects, 72.4 percent of changes in sustainability can be explained by capital structure which is an improvement from only 1.18 percent without intervening effect of management.

The regression analysis also showed that, the standardized Beta statistic for management of community waster projects increased from 0.087 to a high significant value of 0.833 depicting a significant improvement on influence of capital structure on sustainability of community water projects due to mediation of management of water projects. The sixth model of the study $\boldsymbol{Y_6=\alpha_{06}+\alpha_{16}X_5+\alpha_{26}X_6+e}$ was derived as $\mathbf{Y=2.296-0.111X_5+1.14X_6}$.

Table 5.1: Summary of the Results and Hypothesis Testing

Research Objectives	Hypotheses	Results	Table	Remarks
1. To establish the extent to which equity financing influences sustainability community of water projects in Kieni Constituency.	H_{01} There was no significant relationship between equity financing and sustainability of community water projects	r= 0.296* R^2=0.088 F=3.662 p=0.063<0.1	4.16 4.17 4.18	Failure to accept the null hypothesis, therefore rejected (at 90%).
2. To assess the extent to which grant financing influence sustainability of community water projects in Kieni Constituency.	H_{02} There was no significant relationship between grant financing and sustainability of community water project	r= -0.152 R^2=0.023 F=1.303 P=0.259>0.1	4.16 4.19 4.20	Accept null hypothesis,
3. To examine the extent to which debt financing influences sustainability of community water projects in Kieni Constituency.	H_{03} There was no significant relationship between debt financing and sustainability of community water projects	No water project which had acquired debt financing		None of the projects had debt financing
4. To establish the influence of the water user fees on sustainability of community water projects in Kieni Constituency.	H_{04} There was no significant relationship between amount of water user fees and sustainability of community water projects.	r= 0.356* R^2=0.312 F=16.791 p=0.00b>0.1	4.16 4.21 4.22	Reject null hypothesis,
5. Investigate influence of capital structure on sustainability of community water projects in Kieni Constituency.	H_{05} There was no significant relationship between capital structure and sustainability of the community water projects.	R^2=0.11 F=3.380 p=0.540>0.1	4.16 4.23 4.24	Accept the null hypothesis,
6. Explore the extent to which management intervened the relationship between capital structure and sustainability of community water projects in Kieni Constituency.	Management and sustainability H_{06} There was no significant intervening effect on the relationship between capital structure and sustainability of the community water projects.	r =0.846** R^2=0.724 F=47.14 p=0.000b<0.1	4.16 4.25 4.26	Reject the null hypothesis

5.3 Conclusions of the Study

The study concluded that, leadership in community water projects in Kieni is male dominated. Very few women are chairpersons of community water project. This was contrary to beneficiaries who were mostly women. Most chairpersons had modest education level for managing projects that were worth millions of shillings and serve many people.

Majority of water projects were not supplying adequate water to their clients, despite functionality of water project infrastructure being good. Therefore, lack of adequate water was not as a result of water project infrastructure status.

5.3.1 Sustainability of Community Water Projects

Sustainability of community water projects were assessed by combining aggregates of functionality of the water system, status of water project infrastructure and adequacy of water provided by water systems. The study concluded that, majority of community water projects level of functionality was skewed towards functioning with many problems. This study also concluded that majority of boreholes were non-functional.

The second indicator for sustainability was status of water project infrastructure. The concluded that, community water projects infrastructure status was in good condition. The analysed water projects infrastructure were, water pumps, pipes, tanks, taps impounding ware, spill way, cattle troughs and other facilities.

The third indicator for sustainability of community water project was adequacy of water provided by the projects. The study established that majority of community water projects were not supplying adequate water. Given the status and functionality of water project infrastructure that was established to be above average, this means that lack of adequate water was not as a result of poor water project infrastructure. The projects infrastructures were in good condition but supplies inadequate water.

The composite mean of sustainability levels revealed that, most water projects were sustainable since the mean was above neutral and skewed towards sustainability albeit with few problems.

5.3.2 Equity Financing and Sustainability of Community Water Projects

On objective one, the study concludes that, there was unwillingness of the community members to give water provision the support it deserves. The community lack initiative of paying promptly their contribution towards water projects. Equity contribution by the community was inadequate.

Correlation between equity financing and level of sustainability of community water projects and specifically gravity water projects was moderately positive correlation. Therefore, there was a moderate relationship between equity financing and level of sustainability of community water projects. The null hypothesis was rejected, and therefore, the study concluded that, there was significant relationship between equity financing and sustainability of community water projects. Despite the relationship being significant, equity financing accounted for only 8.8% of the variation in levels of sustainability. This meant that, there might be other factors that explain 91.2% of the variation in levels of sustainability.

5.3.3 Grant Financing and Sustainability of Community Water Projects

On objective two, the study concluded that, all water projects received grants from the Government through Ministry of Water, donors, Constituency Development Fund (CDF), and National Arid Lands Authority were not accounted nor managed by the community water committees. There was a weak and insignificant negative relationship between grant financing and level of sustainability of community water projects. Therefore, an increase in grants reduces the levels sustainability. In addition, the null hypothesis two was accepted; hence there was no significant relationship between grant financing and level of sustainability of community water projects.

5.3.34 Debt Financing and Sustainability of Community Water Projects

On objective three, the study concludes that, none of the projects had obtained a loan from any financial institutions. The reasons was that, they were afraid they may not be able to repay the loans, their collection as water user fees may not be able to service the loan or income inconsistency, loans are expensive, lack of knowledge as to how to obtain the loans. Banks were also cautious in advancing loans to community based projects. Reason was, it is difficult to hold the community to account, poor

management systems that changes leadership often and poor financial performances, that is, community projects do not generate sufficient revenues or lack of accountability by their leaders. In addition, most community projects are political in nature and banks avoid political risk.

5.3.5 Water User Fee and Sustainability of Community Water Projects

On objective four, the study concluded that, all community members pay fee to cater for water projects operations and maintenance except for dams and water pans whose water was free. All water beneficiaries pay same amount of water user fee irrespective of the amount used under the gravity water projects which leads to unsustainable water use and wastage of water.

There was a moderate positive relationship between water user fee and level of sustainability of community water projects. The correlation was also significant at 0.10 significant level. The null hypothesis four was rejected. Hence the study concluded that, there was significant relationship between adequacy water user fee and sustainability of community water projects in Kieni Constituency, Nyeri County.

5.3.6 Capital Structure and Sustainability of Community Water Projects

Object five of the study sought to investigate influence of capital structure on sustainability of community water projects. The study concluded that, there was no significant relationship between capital structure and the levels of sustainability of community water projects in Kieni Constituency, Nyeri County. This meant that capital structure did not significantly influence nor have a significant relationship with sustainability of community water projects. Capital structure accounted for 11% of the variation in levels of sustainability. This meant that 88 % of the variation in levels of sustainability cannot be explained by capital structure.

5.3.7Mediatinginfluence of Management on the Relationship between Capital Structure and Sustainability of Community Water Projects

Management of community water projects was the mediating variable in the study. The level of management of water projects was assessed by combining the analysing the level of management effectiveness in the water project, level of community

participation, level of financial management and ability to raise funds. On management of the water projects, the study concluded that management was rated between poor and fair. Community participation was fair. On financial skills of the water committee, the study concluded that they lacked adequate financial skills. The management ability in raising funds was fair.

In addition, there was significant mediating influence of management on the relationship between capital structure and sustainability of the community water projects in Kieni Constituency, Nyeri County, Kenya.

5.4 Recommendations

This section covers recommendations made in the study that were based on the research findings, analysis, interpretation and discussion.

5.4.1 Recommendation to Ministry of Water, Water Service Board, County Governments

The study established that there was huge gender disparity in leadership of community water projects since most chairpersons were male and very few women yet majority of beneficiaries were mostly women. This study recommends that, the Government and other water policy makers craft a policy on how women can be represented in top leadership of community water projects. In addition, most chairpersons had o-level as their highest education level with no further training. This study recommends that Ministry of Water and other water parastatals train chairmen on financial accounting and management, community mobilization and participation and fund raising to build their capacity and make them more effective.

From the study, it was established that majority of water projects were not supplying adequate water to their clients. Despite the status and functionality of water project infrastructure being good. This meant that lack of adequate water was not as a result of poor water project infrastructure. There is therefore need to investigate further the causes of lack of adequate water when water infrastructure is in good condition.

In terms of labour contribution, community members provided labour for gravity water projects only and mean number of days worked was 369 days or one year of labour. However different projects had different number of days provided by community members. One year is a long time for a community member to provide labour, that they were not paid for. This can sink the community into poverty. There is a need to come up with a policy for labour contribution by the community for uniformity.

The study concluded that, there was a moderate relationship between equity financing and level of sustainability of community water projects and equity financing had significant relationship with sustainability of community water projects in Kieni Constituency, Nyeri County, Kenya. Therefore, the study recommends that, the water policy makers should device ways of increasing community contribution to water projects to boost sustainability. There should be a better way for community mobilization and involvement in community water projects especially regarding equity contribution.

All community water projects received grants from the Government through Ministry of Water for construction of the water projects however not all projects management felt that the grants were accessible. The reasons given for inaccessibility included, it is requested through proposal writing which majority of chairpersons did not know how to prepare, lack of personnel to provide information and advice and takes time to acquire it besides being free funds. This study therefore recommends that, community water project management be trained on proposal writing or a technical person be availed to assist them with proposal writing since majority have modest education level. In addition, approval and remission of funds be prompt.

The study also revealed that the District Water Officers account for the Ministry of Water grants and not community water projects committee despite the project being theirs. This study recommends that, the community water committee be jointly accountable for the funds utilization.

The study found out that all community members pay fee to cater for water projects operations and maintenance. All respondents said they pay same amount irrespective of the amount used under the gravity water projects. There was considerable variation

of water fee charges from project to project. This study therefore recommends that water user fee be made uniform and each user point should have a meter. Metering will help reduce water wastage by community members.

5.4.2 Recommendations to Community Water Donors

Some projects managers felt that the grants were inaccessible. This study therefore recommends that, community water project management be trained on proposal writing or a technical person be availed to assist them in proposal writing since majority have modest education level. In addition, approval and remission of funds be prompt.

In terms of adequacy of grants from the Ministry of Water, the study found out that, they were inadequate. In addition, there was a weak negative relationship between grant financing and level of sustainability of community water projects. Therefore, an increase in grants reduces the levels sustainability. This study therefore recommends that donors of community projects take less of grants for their project or make the grant repaid at a flexible and cheaper way in order to ensure ownership and effectiveness and efficiency of grants.

The study also found out that, majority of water projects receiving donor grants, donors themselves account for the money they grant. Therefore, the project committees were not accountable for donor money yet the project is theirs. This study recommends that water management committees be involved in accounting for utilization of donor funds.

5.4.3 Recommendations to the Financial Institutions

The study established that all the projects had not obtained a loan from any bank. The reasons was that, they were afraid they may not be able to repay the loans, their collection as water user fees may not be able to service the loan or income inconsistency, loans are expensive, lack of knowledge as to how to obtain the loans. Interview with bank managers revealed that community projects do not seek for debt financing. Therefore, this study recommends that financial institutions do a

sensitization program with key water stakeholders with a view of giving members advantages of debt financing as they expand their customer base.

5.4.4 Recommendations to Community Water Project Committee

Most members contribute low amounts of equity contribution for an important product like water is low and most community members were not paying the required amount on time. This study recommends that, management improves their mobilization strategies and community participation in order to reduce non-payment or delayed payment of equity finance from the community.

The study concluded that, there was a moderate relationship between equity financing and level of sustainability of community water projects. Therefore, the study recommends that, the management should come up with ways of increasing community contribution and prompt payment to water projects to boost sustainability of community water projects.

On debt finance, the study established that all the projects had not obtained a loan from any bank. This study recommends that, water management committee should improve their financial performance and accountability in order to improve their good will to banks so as to be able to access debt finance. Community projects can also be converted into a corporate body by registering the as companies. Training is also important to water management committee to give them more information regarding debt financing and its benefits.

The study found out that all community members pay fee to cater for water projects operations and maintenance. All respondents said they pay same amount irrespective of the amount used under the gravity water projects. There was considerable variation of water fee charges from project to project. This study therefore recommends that water user fee be made uniform and each user should have a meter. Metering will help reduce water wastage by community members by only paying for what one uses.

Since there was significant relationship between water user fee and sustainability of community water projects, the study recommends that, an optimum level of water

user fee be established and improvement of its collection and management to ensure proper utilization of the collected funds.

5.4.5 Suggestions for Further Studies

1. Investigate influence of capital structure on other non-profit making organizations in different sectors other than water sector.

2. The study found out that, majority of the water projects were functioning with many problems. This study therefore recommends that, a study on causes of non functionality or functioning below the expected design of community water projects be carried out.

3. It was established that majority of water projects were not supplying adequate water to their clients despite the status and functionality of water project infrastructure being above average. This meant that lack of adequate water was not as a result of poor water project infrastructure. There is therefore need to investigate further the causes of lack of adequate water when water infrastructure is in good condition.

4. Most members contribute low amount of equity and delay in their payment for an important product like water. There is need to investigate empirically what are the causes of low contribution and delayed payment.

5. Since no community water project had taken a loan from any bank, nor utilized other debt financing options, this study recommends a more detailed study as to why community projects do not utilize debt financing.

REFERENCES

Abrams, L. (1998). *Understanding sustainability of local water services*. Retrieved from http://www.africanwater.org/sustainability.htm

Adam, C.S. & Bevan, D.L. (2006). Aid and the Supply Side: Public Investment, Export Performance, and Dutch Disease in Low-Income Countries. *World Bank Economic Review*. 20, 261-90.

African Development Fund (ADF) (2005). *Ethiopia; Rural Water Supply and Sanitation Program Appraisal Report*. African Development Fund, infrastructure department; north, east and south, ONIN June 2005.

Adida, A. (2012). *Financial Sustainability of Rural Water Supplies in Western Kenya*.Faculty of Civil Engineering Department of Water Management and Sanitary Engineering Section: Delft University of Technology.

Aiga, F. & Umenai, T. (2002).Impact of improvement of Water Supply on Household Economy in A Squatter Area of Manila.*Social science and Medicine 55,* 627-641

Antonio, G.F. (2005). *The European response to the challenges of water and sanitation in developing countries.*In TRIBUNE, the document of European Commission.

Babbie, E. *(1990).Survey Research Methods* (2nd ed.). Belmont, CA: Wadsworth Publishing Company.

Babusiaus, D. &Pierru, A. (2001). Capital budgeting, investment project valuation and financing mix: methodological proposals. *European Journal of Operational Research, 135, 326-337.*

Bannerjee E. & Morella, H. (2011).*Africa's Water and Sanitation Infrastructure: Access, Affordability, and Alternatives*. Washington D C: World Bank.

Baron, R. M. and Kenny, D. A. (1986). "The Moderator-Mediator Variable Distinction in Social Psychological Research – Conceptual, Strategic, and Statistical Considerations", *Journal of Personality and Social Psychology*, Vol. 51(6), pp. 1173–1182.

Baumann, E. (2006). Do Operation and Maintenance Pay? *Waterlines, 25* .

Beyene, H. (2012). *Factors affecting the Sustainability of Rural Water Supply Systems: The Case of MechaWoreda, Amhara Region, Ethiopia*: A Project

Paper Presented to the Faculty of the Elshorst Graduate School of Cornell University in Partial Fulfillment of the Requirements for the Degree of Master of Professional Studies.

Binder D. (2008).*Sustainability of Water Service Delivery in Rural Environment: Past Approaches and the Way Forward February 2008*: A Project Paper Presented to the Faculty of the Graduate School of Cornell University

Boland, J. & Whittington, D.(2000). *The political Economy of Increasing Block Water Tariffs in Developing Countries. InThe Political Economy of Water Pricing Reforms*. Oxford: Oxford University Press.

Borg, W. & Gall, M. (1989).*Educational Research an Introduction*(5th ed.). New York: Longman.

Brikke, F. (2000).*Operation and Maintenance of Rural Water Supply and Sanitation Systems, A training Package for Managers and Planners*, Geneva: IRC International Water and Sanitation Center, WHO,.

Brikke, F. (1994).*Operation and Maintenance of Rural and Urban Water Supply and Sanitation Systems:* a workshop Report in Support of the Africa 2000 Initiative, 8-12 November 1993, Harare, Zimbabwe.

Brikke, F. & Davis, J. (1995).Making your Water Supply Work: operation and Maintenance of Small water Supplies. *IRC Occasional paper Series 29*, IRC International Water and Sanitation Center.

Brikke, F. & Rojas J. (2001).*Key factors for sustainable cost recovery in the context of community managed water supply.* Occasional paper series 32-E. Delft, The Netherlands, IRC International Water and Sanitation Centre. Retrieved from www irc.nl/content//download/2568/26552/file/op32e.pdf.

Briscoe, J. & de Ferranti, D. (1998). *Water for rural communities: helping people help themselves.* Washington DC: The World Bank,.

Brown, C. & Holcombe, A. (2004).In Pursuit of the Millennium Development Goals in Water and Sanitation. *Water Policy 6:2*

Burd, N. (2009). *On the Money: The Key Financial Challenges Facing Nonprofits Tody – And How Grantmakers Can Help*. (Grantmakers for Effective Organisation, 2009)

Cambridge Dictionary (2003).*Cambridge Advanced Learner's Dictionary Online.* Cambridge University Press: UK. (http://dictionary.cambridge.org)

Cardone, R. & Fonseca, C. (2003).Analysis of cost estimates and funding available for achieving the MDG targets for water and sanitation. *Background report for WELL Briefing Note, 9.*

Carmines, E. & Zeller, R. (1979).*Reliability and Validity Assessment*. Beverly Hills: CA Sage

Carter, R.C. & Rwamwanja, R. (2006). *Functional Sustainability in Community Water and Sanitation: A Case Study from South-West Uganda*. Retrieved from http://www.tearfund.org/Uganda/20Watsan%20final.pdf.

Carter R.C. (1999). Impact And Sustainability of Community Water Supply and Sanitation Programmes in Developing Countries. Published in *Journal of The Chartered Institution of Water and Environmental Management*, 13,292-296.

Casey, C. (2001). Corporate valuation, capital structure and risk management. *European Journal of Operational Research,* 135, 311-325.

Castro, V., Msuya, N. & Makoye, C. (2009). *Sustainable Community Management of Urban Water and Sanitation Schemes* (A Training Manual), AFRICA, W.A.S.P., Nairobi, Kenya.

Central Bank of Kenya, (2009).*Bank Supervision Annual Report.* Nairobi: CBK.

Chandra, P. (2008). *Financial Management: Theory and Practice.* New Delhi: Tat Megra-Hill.

Chambers, R. (1998). *Beyond "whose reality counts" New Methods we now need? Studies in Cultures, Organisations and Societies.* McGrow Hill Publishers

Chia, R. (2002).*The Production of Management Knowledge: Philosophical Underpinnings of Research Design, in Partington: Essential Skills for Management Research.* (1st ed). SAGE Publications Ltd: London.

Chogul, M. (2000). 'A ladder of community participation for underdeveloped countries', H*abitat International* 20, 431-444.

Churchill, A. (1988). '*Time for a Change', World Bank Discussion Paper.*Washington D.C.: World Bank.

Cooper, R. & Schinder, P. (2008). *Business Research Methods*. Singerpore: McGraw-Hill

Corder, G. & Foreman, D. (2009). *Nonparametric Statistics for Non-Statisticians*: A Step-by- Step Approach. Wiley. ISBN 978-0-470-45461-9.

Creswell, J. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* (3rd ed). Los Angeles: Sage Publications, Inc.

Creswell, J. & Clark, V. (2011). *Designing and Conducting Mixed Methods Research.* SAGE Publication, Inc: California

Curtis, L. & Susan N. (2007).*Debt Study*. New York :TDC.

Davis, J., Garvey, G., and Wood, M., (1993).*Developing and Managing Community Water Supplies (*Oxfarm Development Guideline Series: NO. 8) Oxfarm, UK

Department for International Development *(*DFID*)(199*8) *"Guidance Manual on Water Supply and Sanitation Programmes"* Department for International Development/Water and Environment: London.

Dias, A. Jr. &. Ioannou, P.G. (1995). *Optimal Capital Structure for Privately financed Infrastructure Projects: Valuation of debt, equity and guarantees.* UMCEE report no. 95-10, University of Michigan, Ann Arbor.

Dixit, A.K. & Pindyck, R.S. (1995), "The Options approach to capital investment", *Harvard Business Review,* May-June 95, pp. 105-115.

Durgee, J.F. (1984). Phenomology: New Methods for Asking Questions and Interpreting

Jed, J., Gregory D., Christine L. & Edward S. (1999).*The U.S. Nonprofit Capital Market: An Introductory Overview of Developmental Stages,* Results. *Advance Consumer Research.*Vol 12 pp 560-561.

EFNMS, (2011). What does EFNMS stand for? [online]. European Federation of National Maintenance Societies. Available at: http://www.efnms.org/what EFNMS stands-forhtml [Accessed 26 October 2011].Elshorst, H. & O'Leary, D (2005). *Corruption in the Water Sector: Opportunities for Addressing a Pervasive Problem.* Paper presented at the seminar on Meeting International Water Targets Without Fighting Corruption? World Water Week: Stockholm.

Elshorst, H., & O'Leary, D., (2005). *Corruption in the Water Sector: Opportunities for Addressing a Pervasive Problem, Transparency International Prepared for Seminar on Meeting International Water Target Without Fighting Corruption?* World Water week in Stockholm 2005, Sweeden.

Emerson, S (1999). *Investors and Funding Instruments.* New York: Social Purpose Enterprises and Venture Philanthropy.

Esterlin, R. A. (1974). "*Does Economic Growth Improve the Human Lot?*" in Paul A. David and Melvin W. Reder, eds., Nations and Households in Economic Growth: Essays in Honor of Moses Abramovitz, New York: Academic Press, Inc.

Esty, B. (1999). Improved techniques for valuing large-scale projects. *Journal of Project Finance,* Spring 99, 5(1), pp. 9-17.

Field, A. (2000). *Discovering Statistics Using SPSS*. London: Sage Publishing Ltd

Field , A. (2009). *Discovering Statistics Using SPSS*. SAGE Publishers: Carlifornia: ISBN 978-1-84787-906-6

Firer, C., Ross S. A., Westerfield, R. W. & Jordan, B.D. (2004). *Fundamentals of Corporate Finance.* 3rd ed. Berkshire: McGraw Hill

Fong, M., Wakeman, W. &Bhushan, A. (2003). *Toolkit on Gender in Water and Sanitation*. WorldBank, 2003: http://wwwlworldbank.org/gender/resource/checklist.htm**)**

Fonseca, C. 2003. *Cost Recovery: Taking into Account the Poorest and Systems Sustainability. International Congress Watershed management for Water Supply Systems*.New York: American Water Resources Association.

Foster, W. & gal Fine. (2003). *How Nonprofits Get Really Big*. (Stanford Social Innovation Review, Spring 2007).

Fraenkel, J.R. &Wallen, N.E. (2000).*How to Design And Evaluate Research in Education* (4thed). Boston: McGrow-Hill

Gay, L. R., Mills,G.E. &Airisian, P.(2006). *Educational Research Competencies For Analysis and Applications*. New Jersey: Prentice-Hall

Gine, A. & Perez-Foguet, (2008).Sustainablity assessment of National Rural Water supply Program in Tanzania. *Natural resources Forum Volume 32 pages 327-342.*

Gliner, A. J., Morgan, G.A. & Leech, N.L. (2002).*Research Methods in Applied Settings: An Intergrated Approach to Design and Analysis*. London: Psychiology Press and Routledge

Grantmakers for Effective Organizations (GEO). (2007).*General Operating Support Action Guide.*Washington: GEO.

Gow, D. & J. Franken H. (1994). (*Local Governments and participation" paper presented at workshop on participatory development, 17-20 may 1994.* the World Bank.

Hamsici, Onur C.; Martinez, Aleix M. (2007). Spherical-Homoscedastic Distributions: The Equivalency of Spherical and Normal Distributions in Classification. *Journal of Machine Learning Research*, 8, 1583-1623.

Harvey, P. & Reed, R. (2007). Community-Managed Water Supplies in Africa: Sustainable or Dispensable? *Community Development Journal 42(3), 365.*

Harvey, P.A. & Reed, R.A. (2004). Rural Water Supply in Africa: Building Blocks for Handpump Sustainability. *Water, Engineering and Development Centre (WEDC).*Loughborough University, UK

Harpe, J. (2000). *Strengthening Local Governance For Improved Water And Sanitation Services.*IRC International Water and Sanitation Centre. Retrieved from http://www.icp-confluence-sadc.org/prject/docs/publicfile?id=246.

Harvey, P.A. (2006). *Community Dialogue Forum: Project Team Report to the Department of Water*, Zambia.

Harvey, P.A. & Skinner, B.,H. (2002). *Sustainable Hand Pump Projects in Africa: A Report on Fieldwork in Zambia April 18- May 2002*, Leicestershire, WEDC.

Hatch, M. J. & Cunliffe, A. L. (2006), *Organization Theory*, 2nd ed, Oxford University Press: Oxford.

Haysom, A. (2006). *A study of the factors affecting sustainability of rural water supplies in Tanzania,*Msc Thesis, Silsoe: cranfield university. Retrieved from www.wateraid.*Org/other/startdownload.asp.*

International Fund for Africa Development (IFAD) (2007).*IFAD Strategic Framework 2007-2010.* Rome. Institute of Economic Affairs (2010).*A Rapid Assessment of Kenya's Water, Sanitation and Seweage Framework, June 2007* Retrieved 16 August 2013.

Institute of Economic Affairs (IEA), (2007).*A rapid assessment of Kenya water, sanitation sewerage framework.* Institute of Economic Affairs Nairobi, Kenya.

Kafakoma, R. & Silungwe, C. (2003).*Water Ownership and Access Rights in Malawi: Customs, practice and statutory laws. Community Water, Sanitation and Health Project* COMWASH. Malawi.

Kamau, R. G. (2013). *Effects of change in capital structure on performance of Companies quoted in Nairobi Stock Exchange.* University of Nairobi: URI: http://erepository.uonbi.ac.ke:8080/xmlui/handle/123456789/23361 .

Kamuiru, J. K. (2014). Factors influencing community participation in project planning in Kenya. A case study of Mbucana Water Dam project, Kiambu County. *Journal of Business and Change Management*. 2(29), 560 – 582

Kasomo, D. (2007). *Research Methods in Humanities and Education, Research, Statistics, measurement, Evaluation and Testing*.Zapf Chancery Eldoret, Kenya.

Kathuri, J.N. & D.A. Pals. (1993). *Introduction to Education Research.* Egerton University, Njoro: Educational Media Centre.

Katz, T & Sara, J. (1997).*Making rural water supply sustainable: Recommendations from a global study*.Retrieved from http://www.wsp.org/UserFiles/file/globalruralstudy.pdf>

Keating, E., Geeta P., Gregory H. W. & Douglas D. (2007) *Passion and Purpose: Raising the Fiscal Fitness Bar for Massachusetts Nonprofits.* (The Boston Foundation,.

Kerlinger, F. N., & Lee, H. B. (2000).*Foundations of behavioral research*(4th ed.). Holt, NY: Harcourt College Publishers.

Kenya (2014). Demographic and Health Survey. Government Printer: Nairobi

Kenya Food Security Steering Group (2012).*Nyeri District Short Rains 2011/2012 Assessment Report – 25th February, 2012 (Unpublished)*

Khan M. Y. & Jain P.K. (2008).*Financial Management: Text, Problems and Cases*. New Delhi: Tata McGraw-Hill.

Kikula, I.S. (1999). *Lessons from Twenty-Five Years of Conservation and Seven Years of Research Initiatives in the Kondoa Highlands of Central Tanzania*. Ambio 28(5), 444-49.

Kim, E.H., (1978).A Mean-Variance Theory of Optimal Capital Structure and Corporate Debt Capacity", *The Journal of Finance, 33(1), pp. 45-63.*

Kimberley, C. (1998).*Guidance Manual on Water Supply and Sanitation Programs,* WEDC, London, UK.

Kinzinger, R. (2010). *Self-Funding as a Guiding Principle of Project Sustainability.* Talon Company: World Soy Foundation, New York.

Kleeimer, E. (2002). The Impact of Sustainability: An Analysis of the Malawi Rural Piped Scheme Program', *World Development Volume 28,* 929-944.

Kleemeier, E. (2000). The Impact of Participation on Sustainability: An Analysis of the Malawi Rural Piped Scheme Programme. *World Development Volume 28, No. 5 pages 929-944.*

Kothari, C.R. (2004). *Research Methodology: Method and techniques.* Second Edition, New Delhi: New Age International (P) Ltd.

Kraus A. & Litzenberger,R.H. (1973). A State-Preference model of Opimal Financial leverage. *Journal of Finance, September 1973, 911-922*.

Krejcie, R. & Morgan, D. (1970).Determining Sample Size for Research Activities, *Educational & Psychological Measurement. 1970*, 30, 607-610.

Kuria, F. B. (2013). *The Effect Of Capital Structure On The Financial Performance Of Commercial Banks In Kenya.* University of Nairobi: http://erepository.uonbi.ac.ke:8080/xmlui/handle/123456789/58562 .

Lewis, P., Thornhill, A., & Saunders, M. (2007). *Research methods for business students*. Pearson Education UK.

Lockwood, H., Bakalian, A. &Wakeman, W., (2010). *Assessing Sustainability in Rural Water Supply: The Role of follow-up Support to Communities*; Literature Review and Desk Review or Rural Water Supply and Sanitation Project Documents, Britain.

Mackintosh, G. & Colvin, C. (2003).*Failure of Rural Schemes in South Africa to Provide Potable Water*. Environ. Geo. 44, 101.

MacKinnon, D. P. (2008). *Introduction to Statistical Mediation Analysis*. New York: Erlbaum.

Mahama, V. A & Badu-Nyarko, K. 92014). Community Participation in Water Deloivery services and Sustainability in the Savelugu/ NantonMunicipality, Ghana. *African Educational Research Journal*.2(2), 54-60.

Manyena, S.B., Mutale, S.B., & Collins, A. (2008).Sustainability of rural water supply and disaster resilience in Zimbabwe.*Water Policy. 10 , 563-575.*

Marek, L.T and Mancini, J.A (2007). *Sustaining Community –Based Programs: Relationship between Sustainability Factors and Program Results*. Department of Human Development Virginia Polytechnique Institute and State University, Blacksburg

McCommon, C., Warner D. &Yohalen D. (1990). *Community Management of Rural Water Supply and Sanitation Services.* Discussion Paper No. 4, : 49. Washington D.C., UNDP-World Bank.

McLaughlin, T. (2000).*In Cash There is Opportunity.* (The Nonprofit Quarterly, Winter 2000).

McLaughlin, T. (2002).*The Business Roots of Capacity and Mission at Nonprofits. (*Nonprofit Finance fund, 2002).

McLaughlin, T.(2008). More from Nonprofits Now Means Less in the Future. *The Financial Times,* December 9, 2008).

McIvor, C. (2000). *Community Participation in Water Management Experiences from Zimbabwe*. Berlin: Deutsche Stiftung fur Internationale Entwicklung.

MacKinnon, D. P. (2008). *Introduction to Statistical Mediation Analysis*. New York: Erlbaum.

McPherson, H.J.(1994). *Operations and Maintenance of Water Supply and Sanitation Systems: Case Studies*. Geneva; WHO.

Mense, A.T. (2011). *Confidence Interval and Hypothesis: A Primer*. Wiley and Sons: New York.

Michener, V. (1998).The Participatory Approach: Contradiction and Co-option in Burkina Faso. *World Development 26, 2105-2118.*

Miller, C. (2003). *Hidden in Plain Sight: Understanding Nonprofit Capital Structure.* (The Nonprofit Quarterly, Spring 2003).

Miller, C. (2002). *The Business Roots of Capacity and Mission at Nonprofits,* (Nonprofit Finance Fund, 2002).

Miller, C. (2008). The Equity Capital Gap. *Stanford Social Innovation Review*, Summer 2008).

Ministry of Water and Irrigation, (2010).*Annual Water Sector Review 2009*, 48-49 "WSS Tariffs" Retrieved 1 March 2013.

Ministry of Water and Irrigation, (2007). *Annual Water Sector Review 2007*, 11-16 "Water sector financial turnout". Retrieved 1 March 2013.

Misgina, G. (2006).*An assessment of challenges of sustainable rural water supply: The case of Oflaworeda in Tigray Region* (Doctoral dissertation, School of Graduate Studies Regional and Local Development Study (Rlds). An Assessment of Challenges of Sustainable Rural Water Supply: The Case of OflaWoreda in Tigray Region A Thesis Presented to the School of Graduate Studies, Addis Ababa University).

Modigliani, F. & Miller, M. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *American Evxonomic Review* 48(3): 261-297.

Modigliani, F. & Miller, M. (1963). Corporate Income Taxes and the Cost of Capital: A Correction". *American Economic Review*.June 1963.

Moriya, N. (2008). *Noise-Related Multivariate Optimal Joint-Analysis in Longitudinal Stochastic Processes in Progress in applied mathematical modeling*". In Fengshan Yang. Progress in 224

Mukherjee, N. & Van Wijk C. (2003)."*Sustainability Planning and Monitoring in Community Water Supply and Sanitation"*.Water and Sanitation program/IRC2003.

Mumma, A. (2005). Kenya's New Water Law: An Analysis of the Implications for the Rural Poor: Plural Legislative Frameworks for Rural Water Management in Africa (Eds. B. Van Koppen, J.A. Butterworth and I.J. Juma). *Proceedings of a workshop held in Johannesburg, South Africa, 26-28 January 2005.* IWMI, Pretoria.

Murakaru, E. M. (2013). *The relationship between capital structure and Profitability of construction and allied companies listed At the Nairobi securities exchange.* University of Nairobi: URI: http://hdl.handle.net/11295/62984 .

Murega, M. T. (2012). *To Investigate the Effects of Working Capital Management on Corporate Profitability Among Firms Listed at Nairobi Securites Exchange.* University of Nairobi: URI: http://erepository.uonbi.ac.ke:8080/xmlui/handle/123456789/58613 .

Musonde, K. (2004). *Issues Regarding Sustainability of Rural Water Supply in Zambia*. The University of South Africa, M.A in Social Science Dissertation.

MWI, (2005).*Assessing Unit Costs for Water Supply And Sanitation Services In Kenya.* Government Printer: Nairobi.

MWI, (2007).*Value For Money Study – Draft Report*, Ministry Of Water And Irrigation: Nairobi

Myers, R. (1990). *Classical and Modern Regression with Applications (2nd ed.).* Boston, MA: Duxbury.

Myers, S. C. (2001) Capital Structure. *Journal of Economic Perspectives*, 15(2),81-102

Myers, S.C & Mjaluf, N. S. (1984). Corporate Financing and Investment Decision when Firms have Information that Investors do not have. *Journal of Financial Economics*. 13 (2):187-221

Narayan, D. (1995). *The Contribution of People's Participation: Evidence from 121 Rural Water Supply Projects.* Environmentally Sustainable Development Occasional Paper Series, No. 1, World Bank, Washington DC, USA.

Nedjoh, J., Thogersen, j., & Kjellerup, B., (2003).*Challenges of O + M in the Sustainability of Rural Water Facilities. In: 29th WEDC (Water, Engineering and Development Centre) International Conference*, Abuja, Nigeria, 2003.

Nkusu, M. (2004), *Aid and the Dutch Disease in Low-Income Countries: Informed Diagnosis for Prudent Prognoses. IMF working paper No. 04/49.*

Nonprofit Finance Fund (2009). *Linking Mission and Money: An Introduction to Nonprofit Capitalization*, (Nonprofit Finance Fund, 2009).

Nyanchaga, E.N. & Ombongi K. S. (2007). *History of Water Supply and Sanitation in Kenya. 1895-2002* in Juut, Katko and Vuorinen (Eds) Environmental History of Water (IWA Publishing 2007), Section Until Kenyan Independence: 271-280. Retrieved 24 March 2010.

Nyoni, J. M. (1999). Water Pricing Issues In Developing Country: Case of Zimbabwe *IInternational Journal of Social Economics*http://elibrary.ru/contents.asp?issueid=247136.

Nyong, A.O. & Kanaroglou, P.S. (1999). *Domestic Water Demand in Rural Semi-Arid Northeastern Nigeria: Identification of Determinants and Implications For Policy. Environment And Planning.* A 31, 2127-44.

Orua, E, A. (2009). *The Relationship Between Capital Structure And Financial Performance Of Microfinance Institutions In Kenya.* University of Nairobi: URI: http://erepository.uonbi.ac.ke:8080/xmlui/handle/123456789/13415 .

Osborn, D, Cutter, A,. & Ullah, F (2015). *Universal Sustainable Development Goals: Understanding the Transformational Challenge for Developed Countries*. Stakeholders Forum: New York.

Otieno, O. L. (2012). *Capital Structure and Performance at Nairobi Stock Exchange (NSE).* Univeersity of Nairobi: URI: http://erepository.uonbi.ac.ke:8080/xmlui/handle/123456789/13896 .

Oyesiku, O.O. (1998). *Modern Urban and Regional Planning Law and Administration in Nigeria,* Kraft Books Limited, Ibadan.

Pandey, I.M. (2005). *Financial management*. New Delhi: Vikas Publishing House Ltd.

Paraguay IRC (1999): *Community Water Management: PLA Note No. 39* International Water and Sanitation Center, The Hague.

Postnote, (2002).*Access to Sanitation in Developing Countries*. Document of the Parliamentary Office of Science and Technology, No. 190.http://www.parliament.uk/post/home.htm.

Pratt, J.(2002). The Dynamics of Funding: Considering Reliability and Autonomy. *The Nonprofit Quarterly, 2002*.

Rao, J.O. (2013). *Effect of Funding Sources on Financial Sustainability of Water Sector Institutions in Kenya*. University of Nairobi: URI: http://erepository.uonbi.ac.ke:8080/xmlui/handle/123456789/58807 .

Ranasinghe, M. (1999). Private sector participation in infrastructure projects: A methodology to analyze viability of BOT. *Journal of Construction Management and Economics, ASCE 17, 613-623.*

Republic of Kenya, (2014). *Economic Survey 2013 Highlights*. Nairobi: Government Printer

Republic of Kenya, (2007). *National Water Services Strategy: 2007-2015*. Ministry of Water and Irrigation: Nairobi.

Richard C. (1999). Impact and Sustainability of Water Supply and Sanitation Program in Developing Countries. *Journal of the Chartered Institution of Water and Environment Management.* 13, 292-296.

Rosenberg,T., Taylor, Jim & Russel T, (2003). *Learning From the Community Effective Financial Management Practices in the Arts.*(National Arts Strategies).

Roy, J. (2005*). Water, Women and Local Social in the western Kenya highlands.* ICRAF Working Paper No. 12. Nairobi. World Agro Forestry Centre.

Ruijs, A., Zimmerman, A., & Van Den /Berg, M.,(2004). Demand and Distributional Effects of Water Pricing Policies. *Ecological Economies. 66 (2-3); 506-516.*

Rural Water Supply Networks (RWSN) (2009). *Myth of Rural Water Supply Sector. RWSN Perspective paper No. 4 July 2009.*www.rwsn.ch/documentation/skatdocumentation2009-07-27.8158674790/file. Accessed 2012.

Rwamwanja, R. (2006). *Functional Sustainability in Community Water and Sanitation: A case Study from South-West Uganda. Retrieved from* www.tearfund.org/Uganda/29Watsan%20final.pdf.

Ryan, W. (2001).*Nonprofit Capital: A Review of Problems and Strategies*. (Fannie Mae Foundation and Rockefeller Foundation, 2001).

Saunders M., Lewis P., Thornhill A. (2003). *Research Methods for Business Students*. Prentice Hall Publishers 3rd Ed.

Scanlon, J., Cassar, A. & Nemes, N. (2004).*Water as a Human Right?* IUCN, Gland, Switzerland and Cambridge, UK. Retrieved from http:www.data.iucn.org/dbtw-wpd-edocs/EPLP-051.pdf.

Schouten, T & Moriarty, P. (2004).Scaling up the community management of rural water supply. *Water lines Volume 23 No. 2 October 2004*.

Schouten, T. & Moriarty, P. (2003).*From System to Service – draft The Hagu*e, The Netherlands, IRC International Water and Sanitation centre and ITDG, August 2003.

Schwartz, E. & Aronson, J.R. (1967).Some Surrogate Evidence in Support of the Concept of Optimal Financial Structure. *Journal of Finance*, 34(1), 150-153

Shah, S. & Thako, A.V. (1986), "Optimal capital structure and project financing". *Journal of Economic Theory, 42, pp. 209-243.*

Shapiro, C. A. (1991*). Modern Corporate Finance.* New York: Macmillan Publishing Co.

Shapiro, S. S. & Wilk, M. B. (1965). *An analysis of variance test for normality (complete samples)*. Bimetrika 52 (3-4): 591–611

Shaw, D. (2012). *An Assessment of Rural Water Supply Sustainability in Monze District, Zambia.* A dissertation submitted to the University of Bristol in accordance with the requirements of the degree, Master of Science by advanced study in Water & Environmental management, in the Faculty of Engineering.

Shirley Dowdy, Stanley Weardon, Daniel Chilko. (2005). *Statistics for Research. Third Edition. Publisher*: John Wiley & Sons, Inc. ISBN: 9780471267355

Siro, R. O. (2013). *Effect Of Capital Structure On Financial Performance Of Firms Listed At The Nairobi Securities Exchange.* University of Nairobi: URI: http://erepository.uonbi.ac.ke:8080/xmlui/handle/123456789/59242 .

Smith, S.E. & Marin L.E. (2005). Water and the Rural Poor in Latin America: The case Study Tlamacazapa, Guerrero, Mexico. *Hydrogeology Journal 13 pp 346-349.*

Souku, B. (2008). How and When Do Firms Adjust Their Capital Structure Towards Target? *Journal of Finance*. American Finance Association, Vol 63(6) page 3069-3096. Sustainable Development Department, and Food and Agriculture Organisation of the United Nations (1997).*Participation in practice: Lessons from the FAO People's participation programme.* Food and Agriculture

Organisation, Rome.http://www.fao.org/sd/PPdirect/PPre0044.htm (Accessed: June 15 2013).

Sutton, S. (2004*). Preliminary Desk Study of Potential for Self Supply in Sub-Saharan Africa,* UK SC: Water Aid and the Rural Water Supply Network.

Swaroop, V. & S. Devarajan (1998): The Implications of foreign aid fungibility for development assistance. *World Bank Policy Research Working Paper No. 2022.*

Tadesse, A., Bosona, T., Gebresenbet, G. (2013). Rural water supply management and sustainability: The case of Adama – Ethiopia. *Journal of water resource and protection.* 208 – 221, Uppsala, Sweden

Thomas, A. P. & Wolf A.W (1982).*How Much Debt is Right for a Company?* London: Longhorn

UNHCR, (1997).*Partnership in Water Sector for Cities in Africa. Report of Cape Town Consultants*, Cape Town: UNHS/DWSF/UNDP

United Nations, (1992).*Rio Declaration on Environment and Development, report of the United Nations Conference on Environment and Development,* Rio de Janeiro (3-14 June).

UNICEF & WHO, (2012).*Progress on Drinking Water and Sanitation: 2012 update*, WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation, United States of America.

United State Environmental Protection Agency, (2014). *Water Facts: Making A Difference in Water.* XPV Capital Corporation. www.xpvcapital.com/globalwater-infrasteructurespending. (accessed on 10/11/2014).

Vinya, S.A. (2003). *A holistic approach to community water supply and sanitation: The Sarvodaya experience in Sri lanka.* Paper presented at the Third World Water Forum at the Session on "Impact Evaluation Studies to Improve Water Supply and Sanitation Project Design and Implementation" at Kyoto, Japan, 2003.

WASH, (2005). *"Financing water, sanitation and hygiene in Ethiopia: Making every drop count Water, Sanitation and Hygiene for all"* WASH, Tearfund 2005.

Water and Sanitation Program, (2011).*Financing Small Piped Water Systems in Rural and Peri-Urban Kenya September 2011:* Water and Sanitation.

WASREB, (2010a).*Water and Sanitation Coverage – WASREB Impact Report 2009, pp. 20-23.*Rerieved 10 August 2012.

WASREB, (2010b). *Unit cost of operation and average tariff – WASREB Impact Report 2009*, pp. 45-46. Retrieved 10 August 2012.

WASREB, (2011).*Kenya National Water Development Report – 2006.*Retrieved 17 August 2012.

WASREB, (2009).*Performance analysis of Water services boards* – WASREB Impact Report 2009, pp. 54-57, Retrieved 10 August 2012.

Water Services Trust Fund, (2010). *Who we are.* Assessed 18 March 2010.

Wegelin-Schuringa, M. (1998).*Community Management Models for Small Scale Water Supply System.,* Paper for discussion in workshop on public private partnerships in service provision for community managed water supply schemes, held in Kakamega, Kenya, 7-10 December.

WHO,& UNICEF (2010). *Joint Monitoring Programme. Water Supply and Sanitation in Kenya,* Accessed on August 22,2012.

WHO & UNICEF, (2000).*Joint Monitoring Programme for Water Supply and Sanitation.*. ―Global Water Supply and Sanitation Assessment 2000 Report‖

WHO, (2000), *Global Water Supply and Sanitation Assessment 2000 report.* New York: WHO/UNICEF

WHO, (1993).*Guidelines for Drinking Water Quality Volume 1 Recommendations* 2nd edition World Health Organisation, Geneva.

WHO (1996).*Water supply and sanitation sector monitoring report 1996: sector status as of 31 December 1994.* WHO/EQS/96.15. World Health Organisation, Geneva, 1996.

Whittington, D. (2003). Municipal water pricing and tariff design: a reform agenda for South Asia, *Water Policy*, 5, 61-76.

Whttington, D., Davis, J., Prokopy L., Komives, K., Thorsten, R., Lukacs, H,,Bakalian, A., &Wakeman, W., (2008). *How well is the demand-driven, community management model for rural water supply systems doing?*

Evidence from Boliva, Peru, and Ghana. The University of Manchester Brooks World Poverty Institute, BWPI Working Paper 22.

Wood, M. (1994). Are Handpumbps Really Affordable? In 20th WEDC (*Water, Engineering and Development Centre) International Conference*, Colombo, Sri Lanka 1994.

Wood, M. (1994). *Community Management of rural water supplies.* Waterlines, 12(3), 6-9.

World Bank (2011).*Financing Small Piped Water Systems in Rural and Peri-urban Kenya.*World Bank ": New York.

World Bank (1992) "*Village Infrastructure Project for Java". Staff Appraisal Report, Country Department II.East Asia and Pacific Region.* The World Bank Washington, D.C.

World Bank (1993).*"Village Infrastructure Project for Java".Staff Appraisal Report.Country Department III.East Asia and Pacific Region.* The World Bank. Washington, D.C. April 26.

World Bank, (1996).*The World Bank Participation Sourcebook*. World Bank, Washington DC, http://www.worldbank.org/wbi/sourcebook/sbpdf.htm (Accessed: June 05 2013).

Wrench, S.J., Maddox, C. T., Richmond, V.P &McCroskey, J.C. (2009).*Qualitative Research Methods for Communication*. New York: Oxford University Press

WSP & IRC (2003): *Willingness to Charge and Willingness to Pay*: The World Bank assisted China Rural Water Supply and Sanitation Program.

Wyatt, A. (1998). The Maintenance of Infrastructure and Its Financing and Costs Recovery. Nairobi: UN Habitat

Yahaya, S. (2004).*Meeting targets for Water Supply and Sanitation: the African Challenge. Operation Policy and Review department,* ADB pp. 323, Tunis.

Yakubu, N. (1997).*Towards affordable water supply*. In QWEDC CONFERENCE (Vol. 23, pp. 248-250).WATER, ENGINEERING AND DEVELOPMENT CENTRE.

Yetman, R. (2006). *Borrowing and Debt.*(Financing Nonprofits, AltaMira Press, 2006)

Young, D. (2002). *The Perils of Accepting Large (Multi-Million Dollar)* 'Named' Gifts From Major Donors. (NCNE Website, 2002).

Zickmund, W.G. (2003). *Business Research Methods.*7th edition. United States of America: Thomson Publisher.

Zuin, V. (2005).*Productive use of domestic water: A review of the existing literature.* Washington, DC: The World Bank.

APPENDIX 1

LIST OF DONORS

Table 4.List of Donors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		22	37.9	37.9	37.9
	Action Aid, CDF	1	1.7	1.7	39.7
	Arid lands, CDF	1	1.7	1.7	41.4
	CDF	1	1.7	1.7	43.1
	CDF,IFAD	1	1.7	1.7	44.8
	CDTF, IFAD	1	1.7	1.7	46.6
	CDTF,IFAD,ASAL programme, CDF	1	1.7	1.7	48.3
	ECC,CDF,IFAD	1	1.7	1.7	50.0
	EEC, CDF	1	1.7	1.7	51.7
	EEC, Alsal programme	1	1.7	1.7	53.4
	EEC,ASAL programmes	1	1.7	1.7	55.2
	EEC,CDF	1	1.7	1.7	56.9
	EEC,CDTF	1	1.7	1.7	58.6
	IFAD	4	6.9	6.9	65.5
	IFAD, ARID LANDS	1	1.7	1.7	67.2
	IFAD, CDF	4	6.9	6.9	74.1
	IFAD, Flotias	1	1.7	1.7	75.9
	IFAD, well wisher	1	1.7	1.7	77.6
	IFAD,ASAL programme	1	1.7	1.7	79.3
	IFAD,CDF	1	1.7	1.7	81.0
	IFAD,CDF,Arid lands	1	1.7	1.7	82.8
	JICA	1	1.7	1.7	84.5
	NATIONAL Aid	1	1.7	1.7	86.2
	Rotary club	1	1.7	1.7	87.9
	Trust fund,IFAD,water services	1	1.7	1.7	89.7
	Well wisher, ASAL programme	1	1.7	1.7	91.4
	wild forum	1	1.7	1.7	93.1
	wildlife forum, GoK, CDF	1	1.7	1.7	94.8
	World vision, Asal programming	1	1.7	1.7	96.6
	World vision, IFAD	1	1.7	1.7	98.3
	WSTF	1	1.7	1.7	100.0
	Total	58	100.0	100.0	

APPENDIX 2

Frequencies OF Water Project Infrastructure

Statistics

	Pumps	Pipes	Taps	Other facilities	Intake infrastructure	Impounding ware	Spill way	Cattle trough
Valid	6	53	44	36	8	11	7	10
Missing	53	6	15	23	51	48	52	49

Pumps

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Good	4	6.8	66.7	66.7
	Neutral	1	1.7	16.7	83.3
	Very poor	1	1.7	16.7	100.0
	Total	6	10.2	100.0	
Missing	System	53	89.8		
Total		59	100.0		

Pipes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	very good	2	3.4	3.8	3.8
	Good	41	69.5	77.4	81.1
	Neutral	2	3.4	3.8	84.9
	Poor	7	11.9	13.2	98.1
	Very poor	1	1.7	1.9	100.0
	Total	53	89.8	100.0	
Missing	System	6	10.2		
Total		59	100.0		

Taps

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	very good	1	1.7	2.3	2.3
	Good	12	20.3	27.3	29.5
	Neutral	26	44.1	59.1	88.6
	Poor	4	6.8	9.1	97.7
	Very poor	1	1.7	2.3	100.0
	Total	44	74.6	100.0	
Missing	System	15	25.4		
Total		59	100.0		

Other facilities_

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Good	8	13.6	22.2	22.2
	Neutral	27	45.8	75.0	97.2
	Very poor	1	1.7	2.8	100.0
	Total	36	61.0	100.0	
Missing	System	23	39.0		
Total		59	100.0		

Water intake infrastructure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	very good	1	1.7	12.5	12.5
	Good	4	6.8	50.0	62.5
	Neutral	1	1.7	12.5	75.0
	Poor	1	1.7	12.5	87.5
	Very poor	1	1.7	12.5	100.0
	Total	8	13.6	100.0	
Missing	System	51	86.4		
Total		59	100.0		

Impounding ware

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	very good	1	1.7	9.1	9.1
	Good	6	10.2	54.5	63.6
	Neutral	1	1.7	9.1	72.7
	Poor	2	3.4	18.2	90.9
	Very poor	1	1.7	9.1	100.0
	Total	11	18.6	100.0	
Missing	System	48	81.4		
Total		59	100.0		

Spillway

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Good	3	5.1	42.9	42.9
	Neutral	2	3.4	28.6	71.4
	Poor	2	3.4	28.6	100.0
	Total	7	11.9	100.0	
Missing	System	52	88.1		
Total		59	100.0		

Cattle trough

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Good	7	11.9	70.0	70.0
	Poor	3	5.1	30.0	100.0
	Total	10	16.9	100.0	
Missing	System	49	83.1		
Total		59	100.0		

APPENDIX 3

QUESTIONNAIRE FOR BENEFICIARIES

Introduction: I am Solomon M. Mburung'a Reg. No.L83/80901/2011 a student from University of Nairobi undertaking a Doctor of Philosophy in Project Planning and Management. This questionnaire is intended to collect data that will be used in the study to investigate influence capital structure on sustainability of water projects in Kieniconstituency, Nyeri County. In answering the questions, please remember that there are no correct or wrong answers.

Instructions: Please give your honest opinion. Your contribution towards this study will highly be appreciated. All your responses will be handled in confidence. If you have any questions, please do not hesitate please ask the researcher administering this questionnaire.

Please tick (√) in the space provided and fill in the blank spaces appropriately.

<table>
<tr><th colspan="4">SECTION A. DEMOGRAPHIC DATA</th></tr>
<tr><td></td><td rowspan="3">A3. What is your education level?
1. None [ ]
2. Primary School[ ]
3. Secondary School (O-level) [ ]
4. Certificate level[ ]
5. Diploma level [ ]
6. Degree level [ ]
7. Others (Please specify)</td><td rowspan="3">A4. What is your age in years?
1. 18-30 [ ]
2. 1-40 [ ]
3. 41-50 [ ]
4. 51-60 [ ]
5. 60 and above</td><td rowspan="3"></td></tr>
<tr><td>A1. Residence:</td></tr>
<tr><td>A2.What is your gender?
6. Male [ ]
7. Female [ ]</td></tr>
<tr><td colspan="2">A6. Type of project.
1. Gravity fed water project [ ]
2. Borehole [ ]
3. Dam or water pan [ ]
4. Others, (please specify)</td><td colspan="2">A7. Priority uses for the water
1. Livestock [ ]
2. Domestic [ ]
3. Irrigation [ ]
4. Other (please specify)</td></tr>
</table>

SECTION B: EQUITY FINANCING			
B1	Did you contribute money for the start of the water project?	Yes	1
		No	2
B2	Did all beneficiaries contribute the same amount of money for the water project when it was beginning?	Yes	1
		No	2
B3 i	Did you provide labour as your contribution to the water project? *(If no, please skip to question B4)*	Yes	1
		No	2
ii	If yes in **B3i**, what kind of work did you do?	.....	
iii	For how many days did you work for the project?	.....	
iii	Were you paid for the work you did?	Yes	1
		No	2
B4	Do you think the money you contributed has helped in ensuring sustainability of the water project?	Yes	
		No	

SECTION C: WATER USER FEE			
C1	Do you have a water meter?	Yes.	1
		No	2
C2i	Do you pay for the water you use from the water project?	Yes	1
		No	2
C2Ii	If YES in **C2(i)** above, how much do you pay monthly?	Less than 50/=	1
		51 to 100/=	2
		101 to 150/=	3
		151 to 200/=	4
		Above 200/=	5
C2iii	How much do you pay for a 20 liter container?		
		Over Ksh 50	5

		Ksh. 30-49	4
		Ksh 20-29	3
		Ksh 10- 19	2
		Ksh. 1-9	1
C3	**Total**	**6**	4
		Water committee	3
		Community	2
		Other (please specify)	1
C4 i	What do you think about the cost of water provided by this project?	Very fair	5
		Fair	4
		Neutral	3
		Unfair	2
		Very Unfair	1
C4 ii	Give reasons for question C4 ii above	....	
C5	What happens if one has not paid for water?	....	
C6	What do you think should happen if one does not pay?	....	
SECTION D: STATUS AND SUSTAINABILITY OF WATER PROJECTS			
D1. When was the project built?		1. Less than 5 years ago [ ] 2. 5 to 10 years [ ] 3. 11to 20 years [ ] 4. 21 to 30 years [ ]	

	More than 30 years ago. [ ]
D2. How would you rate adequacy of water from the project?	1. Very inadequate 2. Inadequate 3. I can't tell 3. Adequate 4. Very adequate
D3. Does the water project provide adequate water to meet your needs?	Yes [ ] No [ ]
D4. If No in (D3), please explain the reason(s)?	
D5. What is the current state of water project infrastructure? 1. Excellent [ ] 2. Good [ ] 3. Fair [ ] 4. Poor [ ] 5. Very poor [ ]	**B6.** In your opinion, how can the water project be improved? …… …… ……..

SECTION E: COMMUNITY WATER MANAGEMENT			
E1	Who is in charge of the water system repairs when it breaks down?	The water committee	1
		The Government	2
		The community	3
		Donors	4
		Any other (please specify)	5
E2	How would you rate management response to repair of damaged project infrastructure?	Very good	5
		Good	4
		I cant tell	3
		Poor	2
		Very poor	1
E3	How long does it take to repair the water	1 day	1

	system after a breakdown?	2 to 7 days	2
		2 weeks	3
		3 weeks	4
		More than 1 month	5
E4	How can you rate the effectiveness of the water project management committee?	Very Effective	5
		Effective	4
		I can't tell	3
		Ineffective	2
		Very Ineffective	1
E5	What areas should the management improve in order to improve water service delivery?	....	
E6	In your opinion do you think the management has ability to solicit for more capital for the water project?		

Thank you.

APPENDIX 4

QUESTIONNAIRE FOR CHAIRMEN OF WATER PROJECTS

Introduction: I am Solomon M. Mburung'a Reg. No. L83/80901/2011 a student from University of Nairobi undertaking a Doctor of Philosophy in Project Planning and Management. This questionnaire is intended to collect data that will be used in the study to investigate the influence capital structure on sustainability of water projects in Kieni constituency, Nyeri County. In answering the questions, please remember that there are no correct or wrong answers.

Instructions: Please give your honest opinion. Your contribution towards this study will highly be appreciated. All your responses will be treated in confidence. If you have any questions, please do not hesitate please ask the researcher administering this questionnaire..

Please tick (√) in the spaces provided, and fill in the blank spaces appropriately.

SECTION A. DEMOGRAPHIC DATA			
A1. Residence: **A2. Number of years as residence of your current home**: 20 or more years [ ] 10-20 years [ ] 5-10 years [ ] Less than 5 years [ ]	**A3. What is your gender** 1. Male [ ] 2.Female [ ]	**A4. When were you elected chairman of the project** 1. Less than 1 year ago [ ] 2. Between 2-3 years5 ago [ ] 3. Between 3 to years ago [ ] 4. Between 5 to 10 years ago [ ] 5. More than 10 years ago	**A5. What is your highest academic qualification?** 1. Primary School [ ] 2. Secondary School (O-level) [ ] 3. Certificate level [ ] 4. Diploma level [ ] 5. Degree level [ ] 6. Others (Please specify)……

A6. What is your age in years? 1. 18-30 [ ] 2. 31-40 [ ] 3. 41-50 [ ] 4. 51-60 [ ] 60 and above [ ]		A7. What was the total cost of the project? ……..	
SECTION B: EQUITY FINANCING			
B1	Did the members of the community give any cash for construction of the water project?	Yes	1
		No	2
B2	If yes in **B1,** how much did each contribute?	.....	
B3	Did you encounter problems in collecting money from the community?	Yes	1
		No	2
B4	Please, give reason(s) for B3?	.....	
B5	Was the money raised by the community adequate for construction of the water project?	Very adequate	5
		Adequate	3
		I cant tell	3
		Inadequate	2
		Very adequate	1
B6	Did all members pay the required contribution?	Yes	1
		No	2
B7	If NO in B6, what action is taken to those who do not complete their payment?	.....	
B8	What are some of the reasons for non-payment by community members?	.....	
B9	Did the money contributed by community members in increase sustainability of the	To a large extent	4
		A little	3

	water project?	I cant tell	2
		Not at all	1
B10	Did some community members provide labour as their contribution?	Yes	1
		No	2
B11	If yes in **B10**, how many days did they work?	....	
B12	If yes in **B10,** were they paid for the days they worked?	Yes	1
		No	2
SECTION C: GRANT FINANCE			
C1	Did your water project receive funds from the Ministry of Water for construction?	Yes	1
		No	2
C2	If yes in C1 above, how much was received?	.....	
C3	How would you rate accessibility of Ministry of water funds?	Very accessible	5
		Accessible	4
		I cant tell	3
		Inaccessible	2
		Very inaccessible	1
C4	Please give reasons for in C3 above.	....	
C5	In your opinion, how can access to Ministry of Water funds be made more accessible for community water projects?	....	
C6	Was the money from Ministry of Water	Very adequate	4

	adequate for construction of the project?	Adequate	3
		I cant tell	
		Inadequate	2
		Very inadequate	1
C7	Has the Ministry of Water provided money for operation and maintenance of the water project?	Yes	1
		No	2
C8	If Yes in C7, was the money from Ministry of Water adequate for operations and maintenance?	Very adequate	5
		Adequate	4
		I cant tell	3
		Inadequate	2
		Very inadequate	1
C9	Who is responsible for Ministry of Water funds?	Project committee	1
		Project manager	2
		District Water officer	3
		Other (Please specify)	.....
C10	In your view, who should account for the Ministry of Water grants?		
C11	Please give reason(s) for 10	....	
C12	Did the water project receive any funds from donors for construction?	Yes	1
		No	2
C13	If yes in C12, please give the name(s) of the donor(s)?	....	

C14	What are the challenges faced in obtaining donor funds?		
C15	Please give reason(s) for C14?	....	
C16	In your opinion, how can access to donor funds be made easier?	....	
C17	To what extent do you think donors' funds were adequate for the project?	Very adequate	5
		Adequate	4
		I cant tell	3
		Inadequate	2
		Very inadequate	1
C18	Has your project received any donor money for operations and maintenance?	Yes	1
		No	2
C19	If yes in C18, was the money from donors adequate for operations and maintenance?	Very adequate	5
		Adequate	4
		I cant tell	3
		Inadequate	2
		Very inadequate	1
C20	Who accounts for donor funds for operations and maintenance?	Project committee	1
		Project manager	2
		District Water officer	3
		Other (Please specify)	4
C21	In your view, who should account for the donor funds?	Project committee	1
		Project manager	2

		District Water officer	3
		Other (Please specify	4
C22	Please give reason(s) for **C21**.	....	
C23 i	Do donors of your project give you conditions before you get the funds?	Yes	1
		No	2
Ii	If yes in **C23 i** above, please mention them?	....	
C24	Has the water project received any funds from Constituency Development Fund (CDF)?	Yes	1
		No	2
C25	If yes in **C24** above, how much was it?	....	
C26	Has the water project received any funds from National Arid Lands Authority?	Yes	1
		No	2
C27	If yes in **C26** how much?	....	
C28	Has the water project received any funds from Tana Water Services Board	Yes	1
		No	2
C29	If yes in C28 above, was it adequate?	....	
C30	To what extent have the grants helped in	Not at all	1

	sustaining water supply to the community?	A little	2
		To a large extent	3
SECTION F: DEBT FINANCE			
D1	Has your project obtained any loan for construction of the water project? (If NO skip to D7)	Yes	1
		No	2
D2	If yes, please give the approximate amount	....	
D3	If yes in D1, which finance institution did you obtain the loan from?	....	
D4	Has the project been able to make repayments as required?	Yes	1
		No	2
D5	If No, what is the reason for-non repayment?	....	
D6	In your opinion, how would you rate accessibility of the loans from banks?	Very accessible	5
		Accessible	4
		I cant tell	3
		Inaccessible	2
		Very in accessible	1
D7 i	Would you advice a water committee to take a bank loans for a community water project?	Yes	1
		No	2

Ii	Please explain your reason for the above answer in D7i.	....	
D8	Can a loan from improve sustainability of a community water projects?	Yes	5
		No	4
SECTION H: WATER USER FEES			
E1	How much does the water project charge for water connection for new members?	None	1
		1,000 and below	2
		1,001 to 3,000/=	3
		3,001 to 5,000/=	4
		5,001 to 10,000/=	5
		Above 10,000/=	6
E2	Do community members pay any water user fees to cover the water projects operations and maintenance?	No	2
		Yes	1
E3	If yes in E2, do all members pay the same amount of user fee?	No	2
		Yes	1
E4	If yes in E3, how much in per month does the water project charge as user fee?	No charges	1
		Ksh. 50 to 100/=	2
		Ksh.101 to 150/=	3
		Ksh.151 to 200/=	4
		Above Ksh.200/=	5
E5	Who is responsible for setting water user fees?	Government/ Ministry of Water	1
		Water committee	2
		Community	3
		Others (please specify	4
E6 i	Is the amount of money collected as user fee adequate to cover operation and maintenance costs of your water project?	Yes	1
		No	2
Ii	If your answer to question E6i is No, where	Government/Ministry of Water	1

	does the water project get extra money to cover the operation and maintenance cost?	Donors/NGO/FBO	2
		Membership fee	3
		Voluntary contributions/Harambee	4
		Other (please specify)	5
E7	How would you rate adequacy of the water user fees charged by the water project?	Very inadequate	1
		Inadequate	2
		I cant tell	3
		Adequate	4
		Very adequate	5
E8	How would you rate the effectiveness of the methods used in collection of water user fees?	Very poor	1
		Poor	2
		Fair	4
		Good	5
		Excellent	5
SECTION G: MANAGEMENT OF WATER PROJECT			
F1	How would you rate the degree of community participation in operation and maintenance of the water project?	Very Low	1
		Low	2
		Moderate	3
		Good	4
		Excellent	5
F2	Does the project maintain record funds collected?	Yes	1
		No	2
F3 i	Does the water project have a bank account?	Yes	1
		No	2
Ii	If NO in F3i, where is the water project funds kept?	House	1
		Water project office	2
		Other (Please Specify)	4

F4	When do you collect money to cover operations and maintenance expenses?	Daily	1
		Monthly	2
		Quarterly	3
		Half Yearly	4
		Annually	5
		When there is a breakdown	6
		Others (please specify	7
F5	Who authorizes purchases, payments and other uses of funds for the water project?	Chairman	6
		Treasurer	5
		Secretary	4
		Committee Members	3
		Water Project Clerk	2
		Others Specify	1
F6	How would you rate the water management committee's financial management skills?	Very Poor	1
		Poor	2
		Fair	3
		Good	4
		Very Good	5
F7	How would you rate the management in terms of raising funds for the water project?	Very Poor	1
		Poor	2
		Fair	3
		Good	4
		Very Good	5
F8	What are the penalties leveled against people who do not pay for water?	....	
F9	What are the areas that you think the management should improve on to improve quality of service?	…… ……	

OBSERVATION SCHEDULE FOR THE DEPENDENT VARIABLE-

SUSTAINABILITY OF COMMUNITY WATER PROJECTS

The dependent variable was measured using three indicators. the adequacy of water from projects was derived from beneficiaries questionnaire (appendix 1).

1. Level of functionality in the past six months

Level of functionality in the past six months	**Very good**	**Good**	**Neutral**	**Poor**	**Very poor**
	(Uninterrupted water supply for the past 6 months)	(less than 1week interrupted water supply due to breakdown)	(between 2 - 4 weeks of interrupted water supply as a result of breakdown)	(more than 1 month of interrupted water supply)	(Does not supply water)
Fully functioning					
Functioning with some problems					
Neutral					
Functioning with many problems					
Not functioning at all					

2. Conditions of the Water project infrastructure

Infrastructure	**Very good**	**Good**	**Neutral**	**Poor**	**Very poor**
Pumps					
Pipes					
Tanks					
Taps					
Other facilities					

Thank you very much.

APPENDIX 5

DISTRICT WATER OFFICER INTERVIEW GUIDE

Water Project Sustainability

1. What is your role in management of community water projects?

2. What are the reasons for non-performance of community water projects?

3. What are the greatest challenges facing sustainability of community water projects?

4. How can community water projects be made more sustainable?

Capital structure

Grants Financing

5. How much does the government set aside for community water project in your district?

6. In your opinion is the allocated fund enough?

7. What are the requirements for accessing the fund?

8. Do these requirements reduce access to these funds?

9. How many water projects have benefited over from Government grants in this sub county?

10. Approximately how much does each project get in relation to the overall cost of the project?

11. Who accounts for the Government moneys given to water projects?

12. What are the accountability measures in place?

13. How does the government grant influence sustainability of the water projects?

Equity Financing

14. In what way does the community contribute to construction of water projects?

15. What are the challenges faced in soliciting funds from the community for water project construction?

16. In your opinion, is there a relationship between community contribution and sustainability of water projects?

17. Are the water committees able to manage the water project funds well?

Debt Financing

18. Do you know any community water project that has taken a loan for the water project?

19. What is your opinion on loans for community water projects?

Water User fees

20. How do the water projects cater for operations and maintenance?

21. How is the water tariff set?

22. Please comment on management of collected water revenues?

23. How do you ensure the set user fee is fair to community members?

Thank you very much for your time!!!

APPENDIX 6

BANK MANAGERS INTERVIEW GUIDE

Debt Financing

1. Which community water projects has the bank funded?

2. a) Has your bank given loan to any community project?

   c) If yes, did the bank finance the whole project's budget?

   d) What was the collateral? How were the repayments to be made?

3. What can a community water management committee do to convince you to advance loan for construction and maintenance?

APPENDIX 7

Table for Determining Sample Size from a Given Population

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

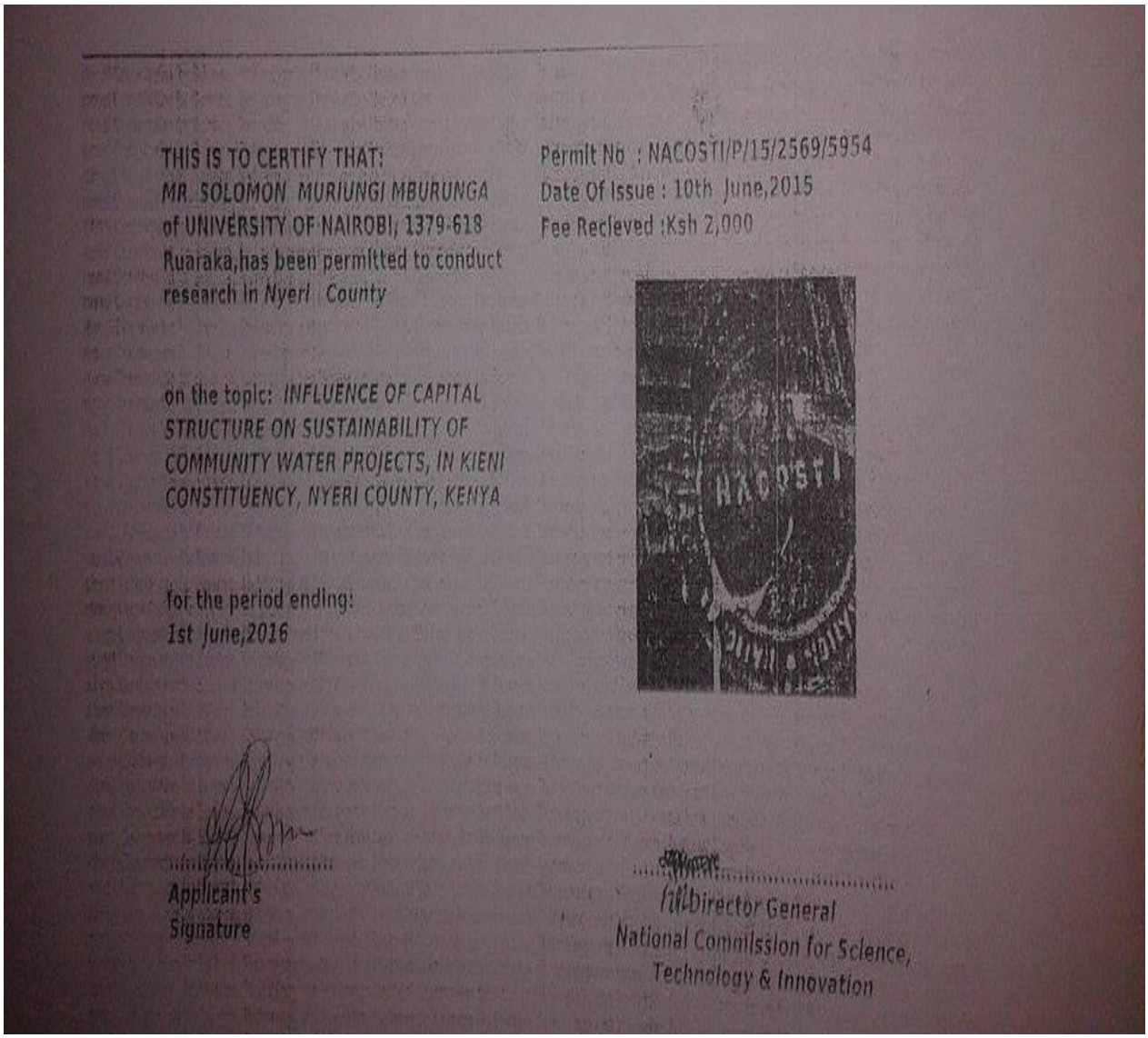
Note.—*N* is population size.

S is sample size.

Source: Krejcie& Morgan (1970)

APPENDIX 8

RESEARCH PERMIT



THIS IS TO CERTIFY THAT:
MR. SOLOMON MURIUNGI MBURUNGA
of UNIVERSITY OF NAIROBI, 1379-618
Ruaraka,has been permitted to conduct
research in Nyeri County

Permit No : NACOSTI/P/15/2569/5954
Date Of Issue : 10th June,2015
Fee Recieved :Ksh 2,000

on the topic: INFLUENCE OF CAPITAL STRUCTURE ON SUSTAINABILITY OF COMMUNITY WATER PROJECTS, IN KIENI CONSTITUENCY, NYERI COUNTY, KENYA

for the period ending:
1st June,2016

Applicant's
Signature

Director General
National Commission for Science,
Technology & Innovation