

**FACTORS INFLUENCING PERFORMANCE OF WATER PROJECTS IN ARID
AND SEMI ARID AREAS. A CASE OF EWASO NG'IRO NORTH BOREHOLE
PROJECTS, ISIOLO COUNTY, KENYA**

MOHAMUD MAIMUNA

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DECLARATION

I declare that this research project report is my original work and has not been submitted for a degree in any other university or college for examination or academic purposes.

Signature:Date:.....

MOHAMUD MAIMUNA

L50/84725/2016

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

Signed..... Date

Prof. Harriet Kidombo

Open Distance and E Learning Campus

University of Nairobi

DEDICATION

I dedicate this research project report to my family for their continued support during the entire period of study.

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ABBREVIATIONS AND ACRONYMS

ASAL: Arid and Semi-Arid Lands

CBO: Community Based Organization

CPM: Community Participation and Management

GoK: Government of Kenya

MDG: Millennium Development Goal

MWI: Ministry of Water and Irrigation

NGOs: Non-Governmental Organization

NRW: Non-Revenue Water

PEER: Professional Executive and Engineer Resource

RBV: Resource-Based View

SPSS: Statistical Package for Social Sciences

UNDP: United Nations Development Programme

UNICEF: United Nations Children's Fund

USAID: United States Agency for International Development

VISP: Vendor Information Services Program

VLOM: Village Level Operation and Maintenance

WHO: World Health Organization

WSB: Water Service Board

WSP: Water Service Providers

WSSS: Water Supplies and Sanitation Services

WUCs: Water Use Committees

ABSTRACT

Most of the water projects in Kenya have been performing dismally with most becoming un-operational or requiring rehabilitation. In Kenya, it is quite a common phenomenon to observe non-functional water projects that are not operational in most parts of the country. However, if the current trends of poor performance of water projects are allowed to continue, rural water facilities will be completely non-functional which significantly lowers the effective coverage. The purpose of this study was to establish the factors influencing performance of water projects in arid and semi-arid areas with reference to Ewaso Ng'iro North Borehole Projects, Isiolo County, Kenya. The study was guided by the following objectives; to determine how community participation, water infrastructure, project management and maintenance funds affect performance of Ewaso Ng'iro North borehole projects in Isiolo County. The study was grounded on the community participation theory, institutional theory and resource based view theory. The study adopted a descriptive research design. The target population composed of employees in different management levels of the 12 development agencies including the NGOs, CBOs and RBOs and government officials from the Ministry of Water and Irrigation. A sample population of 162 is arrived at by calculating the target population of 281 with a 95% confidence level and an error of 0.05 using the below formula taken from Kothari (2004). The study selected the respondents using stratified proportionate random sampling technique. The researcher used a semi structured questionnaire and focus group discussion as the primary data collection tool. The researcher administered the questionnaire individually to all respondents from the government agencies. Data was analyzed using Statistical Package for Social Sciences (SPSS Version 24.0). Descriptive statistics such as frequencies, percentages, mean score and standard deviation was estimated for all the quantitative variables and information presented inform of tables. Inferential data analysis was done using multiple regression analysis. Multiple regression analysis was used to establish the relations between the independent and dependent variables. the study aimed at determining how community participation affect performance of Ewaso Ng'iro North borehole projects in Isiolo County and found that it greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County. Further the study sought to establish how water infrastructure affects performance of Ewaso Ng'iro North borehole projects and found that it greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County. Further the study found that maintenance funds greatly influences performance of Ewaso Ng'iro North borehole projects in Isiolo County. the study concluded that community participation had the greatest effect on the performance of water projects in Ewaso Ng'iro north borehole projects, followed by project management then water infrastructure while maintenance funds had the least effect to the performance of water projects in Ewaso Ng'iro north borehole projects. From the findings and conclusions the study recommends that; The Isiolo County Government and stakeholders should allocates funding towards the development of water infrastructure especially in construction of new pipeline extensions and constructing of new water points in Ewaso Ng'iro North and the use of solar energy as an option to replace the diesel generators or a hybrid system should be explored. More local technicians should be trained on operation and maintenance of generators and hand pumps. The water management committees should be trained on financial management and record keeping. This should be done by the Ministry of Environment, Water and Natural resources.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Access to safe drinking water and sanitation is a global concern, especially as a Millennium Development Goal, and in recent years, it has been increasingly addressed as one of the basic human rights of nations (UNDP, 2014). Clean water is a necessity for all humans. However, more than 1 billion people around the world have no access to clean drinking water. This problem is particularly acute in rural areas and small communities, where water collection may require hours of physical effort, water sources may be contaminated, or must be purchased at rates too expensive to allow for proper health and hygiene.

The escalating water crisis constitutes a major threat for global progress towards sustainable development in the new millennium. There is growing recognition that the urgent and deepening crisis in water stewardship worldwide is a particularly acute problem in countries of In spite of many years of humanitarian aid and development, it remains a major challenge to ensure access to water for all people. The sustainability rate on water projects in developing countries is alarmingly low, due to a lack of resources, capabilities and spare parts for service and maintenance (Hazelton, 2015). However, in most rural areas of the developing world, safe drinking water from an improved source and sanitation services remain unacceptably lacking (WHO-UNICEF 2014). Despite the importance of these issues in the political agenda, water policies in many countries do not promote the creation of appropriate institutions to manage water needs and enhance supply and maintenance capabilities (Saleth& Dinar, 2013).

The administrative structures and institutional support levels to rural areas in most parts of the world are often too weak to address advocacy, encourage citizen engagement, and facilitate finance and management initiatives for the community. Consequently, water sources become nonfunctional after a few years of service (Lockwood, 2014). As a result of this, some scholars have given emphasis to addressing institutional and administrative issues, along with community water education initiatives in Nepal to enhance the sustainability of water supply (Bhandari& Grant, 2014).

Inadequate access to water for drinking, cooking, bathing and cleaning gives rise to social problems associated with poverty. Indeed, a shortage of water is an acute form of deprivation by any standards. It threatens health and physical well-being and affects gender relations and

population patterns. The financial hardship that it both reflects and reinforces has severe repercussions on household livelihoods and family relationships. Effects on health are perhaps the most obvious. It has been estimated that 13 million children under 5 years of age die each year from poor sanitation and other diseases linked to poverty (Redclift, 2014). 'Dirty water and dirty air are major causes of diarrhoea and respiratory infections, the two biggest killers of poor children' (World Bank, 2015).

Gleitsmann (2015) suggested that ownership of water supply project is dependent upon the degree to which the technology corresponds to the needs of the users and the users' ability and willingness to maintain and protect it over time. According to Harvey and Reed (2013), low sustainability rates are related to community issues such as limited demand, perceived lack of ownership, limited community education, and limited sustainability of community management structures, such as water use committees (WUCs).

Besides, water supply projects have been strongly criticized for their planning approaches, which have focused excessively on physical construction and increasing coverage targets, but largely ignored what happens at the water sources after construction (Lockwood, 2014). For the last few decades, literature in the water supply sector has shown that sustainability of rural water supply structures has become positively associated with small-scale initiatives, which maintain public participation. Thus, the key to sustainability is to meaningfully involve the users in the planning, implementation, operation, protection and maintenance of water supply systems according to their needs and potentials (Davis & Liyer, 2012).

Many developed governments and donor agencies have made substantial investments in projects to improve supplies of water in poor rural areas. In addition to funding, external agencies can bring in technical and managerial skills and open up access to credit. They often carry political influence and may provide charismatic leadership to stimulate project development (Aggarwal, 2014).

Despite many years of development efforts, access to safe water supplies and sanitation services (WSS) in the world continues to be extremely marginal. Over 1.2 billion people worldwide; the majorities living in developing nations, particularly in sub-Saharan Africa, 300 million of which 80% live in rural areas still do not have access to clean water facilities (Prokopy, 2015). In Africa, the number of people in rural areas without an improved water supply is six times higher than in urban populations (Baur & Woodhouse, 2009).

A focal issue in the water supply and sanitation sector in developing countries is gauging the willingness of individuals to manage their water sources through the contribution of time and resources (Schouten & Moriarty, 2013). The rationale is that contributing more time and resources to the protection and maintenance of rural water supply sources is a positive action that may potentially improve the sustainability of water supply infrastructures (Gleitsmann, 2015). Harvey and Reed (2013) strongly argue that community involvement, even at the lower intensities of participation, is a “perquisite for sustainability”. The participation of communities based on their willingness to contribute increases effectiveness, efficiency, empowerment, equity, coverage and the overall sustainability of water supply projects (Narayan, 2010). Similar findings were presented by Kumar (2012), particularly mentioning that a demand-responsive approach (DRA) significantly increases the sustainability of water supply projects.

To foster participation in projects, community members’ contributions might take the form of money, labour, material, equipment, or participation in project-related decision-making and meetings (Bhandari & Grant 2009). Moreover, Harvey and Reed (2013) described forms of contribution such as the expression of demand for water, selection of the technology and area, financial contributions, provision of labor and materials, and selection of management systems.

Ultimately, improved planning procedures which fully consider the value and demand placed on different levels of service by the community are a necessity for the ownership of rural water projects (Mbata, 2014). However, in spite of the ever-increasing importance placed on the role of participation in development efforts, there have been few quantitative studies to demonstrate the proposition that participation measurably increases development outcomes (Prokopy, 2015).

Access to clean drinking water has progressed enough to reach the MDG target, 780 million people remain without access to clean drinking water. Only 61% of the population in Sub-Saharan Africa has access to improved water supply sources. People lack proper services because systems fail, often because not enough is invested to appropriately build and maintain them, and also because of the stress that urbanization places on the existing infrastructure. In the past decade, Africa’s population grew at an annual average of 2.5 percent, and the urban and slum population grew at almost double that rate (World Bank, 2015).

The African continent poses the most difficult challenge for achieving the water and sanitation MDG targets. The MDGs for water supply and sanitation services require a doubling of the pace of expansion of coverage in water supply in urban areas and a tripling for sanitation. Recent projections show that following the ‘business as usual’ trends, Sub-Saharan Africa would only reach the MDG targets for water services by 2040, and those for sanitation by 2076 (United Nations Development Programme (UNDP, 2014).

For a long time, measures taken by governments to address service coverage gaps have concentrated on building new infrastructure with little attention given to improving efficiency and productivity of water utilities. Estimates of finance requirements for water and sanitation expansion point to large funding gaps and prospects of private sector investments appear bleak. These realities have compelled major players in the water sector to seek alternative approaches to improving water service coverage.

As noted by World Bank (2015), water utilities in Africa differ greatly in terms of size, organizational culture and operating environments. They share one major challenge of expanding access to appropriate levels of services to their growing urban populations as can be seen clearly in the context of the MDGs where Africa lags far behind other regions. It is now widely acknowledged that the inefficiencies of African water utilities are a major cause of poor access to water services.

In many systems, as much as a third of production is lost through physical and commercial losses and revenues are insufficient to cover operating costs let alone expand service coverage. In addition to the non-revenue water (NRW) challenge, most utilities are currently struggling to cover even their operating costs. In all regions, less than half of the utilities can be considered financially viable and, for many. Thus, it is becoming clear that the real potential in the African water sector lies in increasing efficiency in the existing systems - for example by reducing wastage, improving service quality and securing cash flows (Hukka & Katko, 2004).

In the 1990s, many governments sought to implement policy, regulatory and institutional reforms of urban water supply and sanitation (WSS) services, often with support from international financial institutions. Reforms were badly needed: millions of people lacked access to piped water and sanitation services; and for millions of others, service was often poor. Deteriorated infrastructure, fast urban growth, and large investment needs coexisted with poorly run utilities, artificially low tariffs, and scarce fiscal resources. Water sector

reforms emphasize the need for consumers' protection and their access to efficient, adequate, affordable and sustainable services, whilst ensuring the financial sustainability of service provider (Hukka & Katko, 2004).

Many African governments have reformed their WSS systems in the past two decades to provide better services for their citizens. Countries that have pursued institutional reforms have built more efficient and effective sector institutions and achieved faster expansion of higher quality services. The potential dividend of such efforts is large, because addressing utility inefficiencies alone could make a substantial contribution to closing the sector funding gap in many countries.

Financial sustainability matters are driven by countries' Companies Codes, Securities and Exchange Commissions, the stock exchange listing requirements, regulations and rules and other country-specific regulatory agencies. However, though financial sustainability in Africa is off on a good start, insufficient empirical research limit the basis for comparison of the continent's financial sustainability experiences and outcomes with other continents (Ndung'u, 2014). National and regional governments, local and international NGOs invest large sums every year for the implementation of water supply projects (Gebrehiwot, 2014). However, construction of water projects does not help if they fail after a short time. In order to make the investment in water supplies more effective, failure rates of these systems should be reduced. According to Gebrehiwot (2014), this can be accomplished by better integration of people who receive the water and water project suppliers in decisions concerning planning construction and management of water supply systems.

According to ADF report (2015), about 33% of water supply projects in Ethiopia are Non-functional due to lack of funds for operation and maintenance, inadequate community mobilization and commitment, less community participation in decision making as well as lack of spare parts. As Harvey and Reed (2013) report showed that community issues like perceived lack of education on water supply and sanitation, poor management system and limited demand are related to low sustainability rates of water supply systems (Harvey & Reed, 2013).

Water is the backbone for all known forms of life and therefore it is important to ensure adequate supply in the right quantity and quality. The Government of Kenya recognizes that for the country to meet its poverty-reduction strategies and achieve the MDGs, water has to be made available, accessible and affordable, especially to the poor. This is based on the fact

that all the eight MDGs are directly or indirectly related to access to water. The Kenyan water sector has for a long time been characterized by inefficiencies, lack of investments, poor management and confusing array of legal and institutional frameworks. In addition, the exponential growth of Kenya's urban centers has put increasing pressure on utilities to extend services to new areas. To address these challenges and as part of a global trend, the Government of Kenya introduced far reaching reforms in the water sector to restructure and improve sector performance (Owour & Foeken, 2009).

A major aspect of these reforms was ensuring financial viability of water service providers (WSP). However, most WSPs are financially unsustainable. WSPs are faced with weak management structures, processes and systems and poor systems of revenue collection. Therefore, in order to ensure the sustainability of WSPs, it was vital to investigate the interrelationship and importance of factors impacting corporate sustainability, paying greater attention to financial viability of a WSP (GoK, 2015).

In 2002, major reforms were introduced in the water sector in Kenya. The reforms were carried out to address the policy, regulation and service provision weaknesses experienced in the sector (Owour & Foeken, 2009). The reforms were occasioned by the fact that despite many interventions, close to half of the Kenyan population did not have access to clean water (United Nations-Water, 2014). This entailed separating policy functions from regulation and services delivery.

Service delivery functions were further separated into asset holding (ownership) and investment; and direct water and sewerage services provision (Owour & Foeken, 2009). The key weakness identified in the service provision of water was the financing mechanism in the sector (World Bank, 2015). Specifically, there was poor management of water which led to financial difficulties, the inability of water utilities to attract and retain skilled manpower, high levels of unaccounted-for-water and low revenue collection, including corruption, among others (Government of Kenya, 2014).

Before formation of water private companies, service provision under the local authorities was fraught with frequent shortages and wastage, high unaccounted-for-later, illegal connections, mismanagement of funds from water bills, non-reading of meters, and nonpayment of water, among others (World Bank, 2015). All these compromised the financial situation of water utilities. According to the Water Act of 2002, WSPs in Kenya is private entity companies, which are autonomous, managed independently and run

professionally. WSPs act as agents of Water Service Boards (WSBs). The Water Act 2002 vests in the WSBs the legal ownership of water and sewerage assets utilized by WSPs. Additionally; WSBs have the authority to regulate water tariffs set by WSPs. Reforms in the water service provision as contained in the Water Act of 2002 were to be guided by the principles of decentralization (provision of services at the local level); financial and operational autonomy of the WSPs; institutionalization of financing of water services (through the establishment of Water Services Trust Fund); as well as financial sustainability. The water reforms in Kenya resonated with similar institutional reforms in the water sector across the developing countries, driven by the Millennium Development Goals targets of ensuring increased access to adequate and quality water (Government of Republic of South Africa, 2002).

At the national level, the challenge of financial sustainability poses a major challenge to the water service providers. A study of water service providers in Tanathi Water Services Board found out that only four of 15 WSPs were able to meet their financial obligations (Tanathi Water Services Board, 2009). In addition, most of the WSPs had weak management structures, processes and systems, had poor systems of revenue collection, and they were unclustered therefore facing diseconomies of scale (Republic of Kenya, 2014).

At Independence in 1963 Kenya's population was 7 million. It is now approaching 40 million and like many other African countries, Kenya faces serious difficulties in trying to help its people meet the need for water that is reasonably convenient, and above all safe (Onjala, 2012). Much of the country is arid or semi-arid. Most rural people are poor. There is lack of enough fresh water resources which has led to water-borne disease, poor hygiene and lack of sanitation facilities. The increased population growth rate has over-stretched the available fresh water resources leading to water scarcity (Onjala, 2012).

In Kenya, just like in other parts of Africa, water is scarce in some parts of the country forcing women and children to trek long distances to fetch water. The exact groundwater potential of the country is unknown, but it has been estimated to be approximately 2.6 billion m³ (ADF, 2015). Despite this abundance, many Kenyan people have suffered from a lack of access to safe drinking water for centuries. The eastern part of Kenya is one of the areas where lack of clean water has led to the education of the girl child being compromised and the health of the community at stake due to water borne diseases. In the blue print Vision 2030 under the economic pillar are the Flagship projects for Tourism to spur development.

The specific strategies for realizing the goals will involve: an aggressive strategy to develop resort cities in three key locations that includes Isiolo Town. The development of the resort city and increase in human population will require more water. For sustainability and to reduce stress, there is need to sustain rural/community water supplies.

The Water Act 2002 encourages the participation of all relevant stakeholders. The new institutions both in WRM and WSS involve the NGOs and civil society organizations in participatory forums in which decisions about interventions are discussed. However, it is clear that representation from local communities and consumers is minimal and not well structured to be representative enough since community involvement particularly in rural and poor urban areas is limited.

1.1.1 Isiolo County

Isiolo County is one of the thirteen counties of eastern province of Kenya and it borders Marsabit County to the north Garissa to the south west and Wajir district to the east. It also borders Tana River, Meru North and Meru Central to the south and Laikipia and Samburu districts to the West. The County covers an area of 25,605 square kilometers and is divided into 6 administrative divisions namely Central, Garbatulla, Sericho, Merti, Oldonyiro and Kinna. There are 22 locations and 44 sub-locations. The district has 2 constituencies; Isiolo North and Isiolo South. Isiolo is inhabited by among other groups the Borana, the Somali, Turkana, the Samburu and the Meru. This makes the district one of the most cosmopolitan districts in Kenya. The 2009 census put the population of the district at 143,000 people. The Central division is densely populated due to its well-developed infrastructure and being a common rural centre with a total population of 52,280 people. People in other areas tend to settle around watering points. Nearly three quarters of the county total population lives below the poverty line.

There are four perennial rivers in the district namely Ewaso Ng'iro which originate from Mt. Kenya and Aberdare Ranges, Kinna, Isiolo River and Bisanadi which originate from Nyambene Hills. Boreholes, rivers and pans are the main sources of water. Distances of access to water for domestic use has improved by an average of 5km one way. Livestock access distances to water sources also improved. There are 59 water points in Isiolo County most of which are either not operational or requires rehabilitation.

1.1.2 Ewaso Ng'iro North Borehole Projects

The Ewaso Ng'iro North Borehole Projects optimizes the increasingly common situation in Kenya of population pressure resulting in excessive abstraction of river water in the humid highlands leaving little water for downstream users in the arid and semi-arid lands (ASAL). A combination of increased water extraction by middle catchment farmers and deterioration in the vegetative cover of the upper catchment have combined to reduce water flows in the Ewaso Ng'iro North River and its tributaries throughout most of their length. The issues are already critical along a number of tributaries where violent conflicts have broken out between downstream and upstream water users.

Increased demand for water, the need to regulate river recharge upstream, so as to reduce the severity of floods and droughts downstream, has become ever more important. The Ewaso Ng'iro North Borehole Projects contribute significantly to achieving the Millennium Development Goals of halving the proportion of people without sustainable access to safe drinking water and promoting gender equality and empowerment of women through their involvement in project activities.

1.2 Statement of the Problem

Management of water points is an important aspect of sustainable delivery of water resources to both the rural and urban populations in Kenya (Kakumba 2010). Although Ministry of Water and Irrigation in collaboration with both international and local organizations, is actively involved at the grassroots level to improve the situation, clean water supply coverage is still in its infancy in many parts of the country. It is estimated that more than 60% of the Kenyan population do not have access to clean water despite the fact that much of the country have reliable water sources and adequate rainfall. The situation is worse in rural areas, occupied by the majority of the population. The ongoing efforts, which are measured based on the performance in achieving short term objectives need to be re-engineered to raise their output by 2000% to meet the water and sanitation Millennium Development Goals (MDGs) by 2015 (MWI, 2011).

Earlier studies provide figures of operational failure rates from individual African countries ranging from 30% to 60% (Lockwood 2014). It is estimated that 55% of all rural water supplies/projects in Kenya, Tanzania and Uganda are not functioning (Baumann, 2009), and despite the frequency with which it appears in development discourse, the reality of sustainability remains elusive. The widespread failures in water supplies have been attributed

to a number of flaws in the project; the intervention was not desired by the community, the capital and/or recurrent costs are too high for the community, lack of ownership results in neglect of maintenance and repairs, the promised benefits don't materialize, education programmes are too short and trained members of the community move away or lose interest (Carter, Tyrrel&Howsam, 2011).

Most of the water projects in Kenya have been performing dismally with most becoming un-operational or requiring rehabilitation. In Kenya, it is quite a common phenomenon to observe non-functional water projects that are not operational in most parts of the country (MWI, 2011). However, if the current trend of poor performance of water projects is allowed to continue, rural water facilities will be completely non-functional which significantly lowers the effective coverage. This is manifested in some water project such as Isiolo water supply; LMD Borehole being nonoperational after very few years of operation while even those in operation is either silted up or requires rehabilitation. Currently, there seem to be low level performance of water projects in Isiolo County in Kenya, resulting from low levels of ownership at community level especially in the Ewaso Ng'iro North Borehole Projects. And yet participation alone without effective community organization and leadership to carry out operation and maintenance and other mobilization activities of rural water supply may not work. Similar study by Donge for example reveal that, non-functionality of water sources could be resulting from lack of maintenance, irresponsibility of users and 'free-riding', all of which cause management failures (Donge, 2013).

Ali (2015) looked at determinants of community ownership of water projects in central division, Isiolo County. Management of water points is an important aspect of sustainable delivery of water resources to both the rural and urban populations in Kenya. Currently, there seem to be low level of community participation of rural water supply in Kenya, leading to low levels of ownership at community level. Rimberia (2012) studied on the determinants of water projects sustainability in Kieni East Division, Nyeri County. The sustainability rate on water projects in developing countries is alarmingly low, due to a lack of resources, capabilities and spare parts for service and maintenance. Kemuma (2015) assessed the determinants of financial sustainability in water resources management authority in the Kenyan water sector. None of these studies has looked at water project performance in Ewaso Ng'iro North borehole projects in Isiolo County. Therefore this study will answer the question what are the factors influencing performance of water projects in arid and semi-arid areas?

1.3 Purpose of the Study

The purpose of this study was to establish the factors influencing performance of water projects in arid and semi-arid areas with reference to Ewaso Ng'iro North Borehole Projects, Isiolo County, Kenya.

1.4 Objectives of the study

The study was guided by the following objectives

- i. To determine how community participation affect performance of Ewaso Ng'iro North borehole projects in Isiolo County.
- ii. To establish how water infrastructure affect performance of Ewaso Ng'iro North borehole projects in Isiolo County.
- iii. To establish the effect of project management on performance of Ewaso Ng'iro North borehole projects in Isiolo County.
- iv. To assess the influence of maintenance funds on performance of Ewaso Ng'iro North borehole projects in Isiolo County.

1.5 Research Questions

This research study sought answer to the following questions;

- i. How does the level of community participation affect performance of Ewaso Ng'iro North borehole projects Isiolo County?
- ii. How does water infrastructure affect performance of Ewaso Ng'iro North borehole projects in Isiolo County?
- iii. To what extent does project management influence performance of Ewaso Ng'iro North borehole projects in Isiolo County?
- iv. What is the influence of maintenance funds on performance of Ewaso Ng'iro North borehole projects in Isiolo County?

1.6 Significance of the study

Kenya just like the rest of the developing countries is experiencing a radical change in the performance of water projects in ASAL. The study is seeking to identify and practically measure through research, the level to which various factors taken into consideration has

influenced performance water projects. Through this study it is expected to be of great help in to the following; the management of Ewaso Ng'iro North borehole projects, county government, local residents and researchers and academicians.

County Government

This study will be significant to many water resources management in Kenya that are struggling to triumph and supply quality water sustainably. With regards to the management, the study will be of significance in a twofold manner: management in organizations are charged with the responsibility of creating policies and practices for resource management which play a key role in influencing water conservation and supply. This implies that the findings will provide a clear picture of the link between performance and on how best they can be harmonized to meet the intended results.

Local Residents

To the local residents living in Isiolo County, the study may create awareness among them on the benefits of water resource sustainable use and their role in improving water management. The general public, the research will give an overview of the Ewaso Ng'iro North Borehole Projects potential hence it may create awareness on water supply in the county.

Researchers and Academicians

The findings of this study may enrich existing knowledge and hence may be of use to both researchers and academicians who seek to explore and carry out further investigations. The study will provide the background information to research organizations and scholars who will want to carry out further research in this area. The study will facilitate individual researchers to identify gaps in the current research and carry out research in those areas.

1.7 Delimitations of the study

The study focused on factors influencing performance of water projects in arid and semi-arid areas. The study was carried in community water projects in Ewaso Ng'iro North borehole projects in Isiolo County. The respondents included employees in different management levels of the development agencies including the government, NGOs, CBOs, RBOs and the community members served by the projects including the users and members of the management committees.

1.8 Limitations of the study

The study anticipated to encounter some limitations that might hinder access to information that the study sought. The respondents targeted in this study might be reluctant in giving information fearing that the information being sought might be used to intimidate them or print a negative image about them. The researcher hoped to handle this by carrying an introduction letter from the University to assure them that the information they gave was treated with confidentiality and was used purely for academic purposes.

Communication was a problem due to language barrier and education levels of the respondents especially the community surrounding the conservancy. The researcher however used local interpreters from within the interview locations. Local school leavers were also engaged at a fee to help in data collection.

The other limitation that the study was based in Isiolo County the study may not include more counties around the Country owing to the amount of time and resources available. This study therefore suffered from generalizability of the results if the nature of projects undertaken were significantly different from those in Isiolo County. In addition, the findings of this study were limited to the extent to which the respondents were willing to provide accurate, objective and reliable information. The researcher checked for consistency and test the reliability of the data collected.

1.9 Assumptions of the study

The assumptions of the study were that the sampled population represents the general population of Isiolo County. The methods of data collection were accurate and valid to enhance acquisition of the required data, the respondents were truthful and gave correct information and that the chosen respondents were willing to give the required information freely. The study also assumed that there were no serious changes in the composition of the target population that might affect the effectiveness of the study sample. Finally, the study assumed that the authorities in the project will grant the required permission to collect data from the stakeholders.

1.10 Organization of the Study

This study is organized into five chapters. Chapter one contains the introduction to the study. It presents background of the study, statement of the problem, purpose of the study, objectives of the study, research questions, significance of the Study, delimitations of the

study, limitations of the Study and the definition of significant terms. On the other hand, chapter two reviews the literature based on the objectives of the study. It further looked at the conceptual framework and finally the summary. Chapter three covers the research methodology of the study. The chapter describes the research design, target population, sampling procedure, tools and techniques of data collection, pre-testing, data analysis, ethical considerations and finally the operational definition of variables. Chapter four will present analysis and findings of the study as set out in the research methodology. The study will close with chapter five which presents the discussion, conclusion, and recommendations for action and further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents the literature review on the performance of water projects. It summarizes the information from other researchers who have carried out their research in the same field of study. The chapter presents the empirical review on community project ownership, water infrastructure, project management and maintenance funds; theoretical review and finally the conceptual framework. The study also presents the knowledge gap the chapter seeks to fulfill.

2.2 Community Participation and Performance of Water Projects

For a long time, community participation and management (CPM) have been considered by most developing countries as important tools to enhance public engagement and ownership over community development projects so as to attain sustainability. Participation plays a major role in people's management of their own affairs. Ownership and control of resources have a profound impact on participation in development projects. According to Mathbor (2014), emphasis is made on the following areas as crucial in a participatory service and resource management programs: Community Organization (CO), Community Management (CM), greater economic and social equality, better access to services for all, greater participation in decision making, and deeper involvement in the organizing process resulting from the empowerment of people. All these are aimed at achieving sustainability in the development projects.

According to Katz and Sara (2008), the existence of a formal community organization that operates the system affects the overall sustainability of a water project, showing that it is significantly lower in communities that lacked such organizations. Nevertheless, there is a strong need to distinguish between 'community participation' and 'community management', since perceptions of what these terms mean vary greatly. The former is a consultative process designed to establish communities as effective decision-making entities. The latter is a bottom-up development approach whereby the beneficiaries of the water supply assume full responsibility, authority and control over it.

Based on the low rural water supply sustainability levels which remain throughout developing countries, community participation has gained widespread acceptance to be a prerequisite for sustainability, i.e. to achieve efficiency, effectiveness, equity and replicability

(Gleitsmann 2015) while community management has not (Harvey & Reed, 2013). The reasons for the breakdown of management systems are numerous. The major one is the misconception that services can be managed autonomously by communities, and that governments need only to promote beneficiaries' involvement and then be side-stepped in the process of service delivery by external support agencies (Harvey and Reed, 2013). First, participation is not straightforward, and for it to be authentic requires at least social inclusion and democratic engagement (Gleitsmann, 2007). Second, community management or any other alternative of management at the "lowest appropriate level" can only become sustainable with appropriate institutional support (Harvey and Reed, 2013), where governments do not neglect their responsibilities to enable communities to realize this. To this end, a qualified district or regional organization (government agency or NGO) will be needed to ensure the long-term functionality of the schemes and to support the programs which they promote. It is needed both as a source of trained technicians, encouraging and motivating the community, periodically monitoring the service performance, and guaranteeing an efficient and an appropriate spare parts supply chain; among others. As mentioned, there is room for improvement in the majority of districts in terms of capacity building and institutional support. Little attention is currently given to which institutions achieve such outcomes.

Therefore, a clearer strategy needs to be defined for both implementation stage and after project completion, in which appropriate resources allocation should be thoroughly identified. Another key limitation is the perception that 'ownership' is a prerequisite for community management and is thus crucial to the success of the project (Doe & Khan, 2014). The sense of ownership (and actual legal ownership) that the village water entities have over their new water points is in direct contrast with the understanding that the villagers used to have in the past. The implementer used to work alone in identifying sites and constructing the projects, and when they broke down, the villagers did nothing to repair, apparently stating that they belonged to the implementer and not to them. There is a widespread sense that ownership of the water supply facility will lead to a responsibility for its management; though in reality, just because a community owns a facility does not necessarily mean that it will acquire a sense of responsibility for its management, nor does it guarantee a willingness to manage or pay for its operation and maintenance. Therefore, it may be more effective to abandon the desire to achieve community ownership and to develop a sense of responsibility for financing the upkeep of the facility (Harvey & Reed, 2013).

One important example of a community-based approach to provision of rural water is South Africa's national water and sanitation program, which is one of the largest in Africa. It started in 1994. The goal of this program was to provide free basic water nationally. The government provides 100 percent of capital costs for both water and sanitation. The Department of Water Affairs and Forestry was handed responsibility for implementation to local governments. The Water Services Authority was created as the local regulator of water services. According to Mackintosh (2014), the program provided water infrastructure for 10 million additional people in 10 years (from 1994 to 2004). However, Harvey and Reed (2013) found that local governments have limited capacity to implement and finance the free, basic water policy.

Using survey data from Sri Lanka and India, Isham and Kahkonen (2012) found that well-designed and well-constructed water services are two significant factors for effective community-based approaches. The authors found that it is important to involve household members in the design process and in the final decision about the type of system to build. Likewise, systems work better if the households' contribution to construction (for example, cash or labor) is monitored. Social capital was found to be associated with the above two factors. In communities with higher levels of social capital (for example, with more active community groups), community members were more likely to engage in design as well as monitoring.

Using a household survey carried out in the Ghanaian Volta basin during 2001, Engel, Iskandarani, and PilarUseche (2005) examined participation decisions for an improved water supply. They found that among the households with access to improved water, a considerable proportion (about 43 percent) continued to use unsafe sources as their main domestic water source. To analyze supply and demand characteristics, the authors use a discrete choice model where the dependent variable is a household's decision to choose the improved water source.

According to Wambugu (2009), the Water Project in Mwitha Primary School, Sikhendu on the slopes of Mount Elgon has given Interchristian Fellowships' Evangelical Mission (IcFEM) the opportunity to develop a locally-run Borehole Management Committee to manage the future work relating to the borehole planned for Mwitha Primary School. This is an important part of the project since sadly a percentage of community-based water projects in other rural areas worldwide fail due the lack of community ownership and the inability to cope with operational and repairs issues if faults occur with the equipment. There is

determination in the communities of Sikhendu to ensure that this situation does not occur with the project at Mwitha Primary School and evidence of this was shown by the training sessions held recently to train the Mwitha Borehole Management Committee.

Wambugu (2009) also deduced that before the opportunity for this project arrived, IcfEM's local community leaders in Sikhendu had already been collecting information and mobilizing community support for future water projects in the area, as they looked for funding partners to make their dream for clean water a reality to address the high number of water-borne diseases suffered in the area. As a result, it was not surprising when they had a strong response to the opportunity for local community health workers to receive training in sanitation and hygiene through the partnership between IcfEM and The Water Project.

Revena (2009) did an assessment of factors influencing sustainability of foreign aid projects a survey of Imenti North District Kenya and recommended that variables that influence sustainability, such as disputes among local leaders should be studied on. On the other hand, Ngetich (2009) observed that if project is useful and meeting peoples need then it will get support and reflect on ownership thus sustainability. Ngetich recommended capacity building for empowerment, gender mainstreaming and sensitization to environmental concerns. Ngetich recommends further studies on distance of projects to the users and disaster preparedness.

Mwithaga (2009) also did a study on the role of community water projects in alleviating poverty a survey of Buuri Division, Buuri District. In the summary of findings, indicated that, regardless of donor, the projects had reduced trekking distance, were well utilized for various uses, immense economic benefits and contribution to the well being of the people. None of the local or international studies have focused on the factors affecting community ownership of water projects in Isiolo County.

2.3 Water Infrastructure and Performance of Water Projects

The use of appropriate water infrastructures which are low cost, easy to maintain, simple to use and readily available is one response to the challenge of ownership of water projects in Isiolo County. Appropriate technologies are integral to the concept of Village Level Operation and Maintenance (VLOM) which emerged in the Water Decade (1981 – 1990). Many of its basic principles are still guiding the water sector today, though a tension persists between the ease of maintaining a system and its durability (Reynolds, 2011). The VLOM conceptualization of the community as an island also neglects to recognize the role of

external support agencies, such as the government, in achieving sustainability (Webster, Dejachew, Tseion, Mehari, & Tesfaye 2013).

Experiences in many projects have shown that technical issues cannot be ignored on the basis of the argument that they have nothing to do with managerial aspects. However, technical options should be seen as part of the management solution, not as goals in themselves. There is therefore a need to balance training to include sufficient technical focus (Batchelor, 2010). Even where community members are trained in pump maintenance, some repairs are beyond their ability. Ongoing technical support is therefore required for difficult technical repairs and ongoing institutional support is required to encourage ongoing social mobilization in Isiolo County.

It has been suggested that 'beneficiary participation is the single most important factor contributing to project effectiveness' (Holtslag, 2012). Without participation, it has been claimed that systems are unlikely to be sustainable even if spare parts and repair technicians are available. Participation can take different forms, including the initial expression of the demand for water, the selection of technology, the provision of labour and local materials, a cash contribution to the project costs, the selection of the management type and even the water tariff (Harvey & Reed, 2007). It is thus the process through which demand-responsiveness is exercised, and empowerment achieved.

It is important that rural water supply projects present communities in Isiolo County with a true water infrastructure choice and that they are made aware of the financial and managerial implications of each possible option. The price of a technical option to a community should be based on the actual cost of delivering and sustaining the service and the people's willingness to pay for it (Deverillet, Bibby, Wedgewood & Smout, 2012). Water users need to have the freedom to choose what type and level of water services they are capable of managing without any undue external pressure. Ease of operation and maintenance, user acceptability and cost must be considered jointly. If a water supply system is not maintained it is because it is too complicated, not 'attractive' or too expensive (Holtslag, 2012).

The research to date clearly demonstrates that the hand pump should be seen as an option in rural water supply programmes not an exclusive choice. Simpler technologies (such as the rope-and-washer pump) or local alternatives to hand pumps (such as an open well with bucket and windlass) require greater consideration if systems are to become fully sustainable without continued heavy external support as is the case of most water projects in Isiolo

County. This is primarily because the provision and distribution of spare parts becomes easier. The principal of offering communities a range of choices of technology should be planned carefully if it is to be successfully put into practice (Deverill et al., 2012). The ease of maintenance and operation procedures, and the availability and cost of spares must be considered, and detailed O&M costing should be provided for each technology choice. Thus, for the community to fully own the water projects in Isiolo County the technology used should be easy to maintain and operate and the spare parts should be affordable and available.

2.4 Project Management and Performance of Water Projects

It is common practice for village water schemes to be managed by a village committee of some sort; the creation of which is intended to enable communities to have a major role in the project, to have a sense of ownership over the scheme and to ensure its ongoing operation and maintenance (Harvey & Reed, 2013). Many of the success factors in any project flow from good leadership and management (Mawunganidze, 2012). Well managed water projects will have good monitoring data and gather feedback from the community; they will put in place good governance principles and structures to enable smooth succession and will have links with other stakeholders. A strong management board will provide support and offer expertise, networks and good representation.

While good leadership is critical in enhancing community ownership of water projects, the breadth and depth of capacity and experience within the water committees is also vital. Many of the projects involve a balance between community management, financial expertise and technical knowledge (Kleemeier, 2010). A number of the water projects have relatively high powered boards with Councillors and senior private sector representatives alongside community members. This can be very helpful both in offering technical knowledge and experience, but also in securing other support.

Having a clear vision, realistic objectives and identified actions is another factor that is important in enhancing ownership (Deverill et al., 2012). This makes it easier to manage community expectations and reduces the possibility of friction once the projects have started. Where these are not clear, it can cause confusion and lead to divisions within the community in Isiolo County.

Community participation in maintenance of the water projects is not critical to proper function but strong leadership is important. Good governance at the community level during the project cycle is positively correlated with a more sustained water supply. Where projects

use existing community management structures the sustainability of the water point is better than where a new committee is set up (Batchelor, 2010).

Kinuthia, Warui and Karanja (2009) in their study in Mbeere found that some of the group-owned water points lack effective committees and this challenges management. Others are improperly protected which exposes them to possible pollution or contamination through run off, dumping of materials and siltation. Proper protection is required to maintain water quality. Similarly, some water points are seasonal and are therefore unreliable in supplying water especially during the dry season.

Kumar (2012) asserts that the main indicators of likely success relate to the leadership and the capacity of the management team. In almost every case it is the combination of the personal qualities of the project leader, backed by a strong range of more and wider skills and experience in the board, that make for a strong water project. A strong management committee will provide support and offer expertise, networks and good representation.

According to Harvey & Reed (2013), Participation of women in water project management provides an effective means to mobilize resources, to tap knowledge and energy, and above all provides legitimacy to the project or activity, and promotes commitment and ownership, and thus sustainability.

Further Ockelford and Reed (2012) intimates that having the right core team can make or break a project and therefore, the community must take care when selecting the team members. The elements to consider include: overall team composition, team selection criteria, team size and the process for selecting team members. On team composition, they indicated that a well-rounded team includes a mix of people and skills. The team should include: some individuals who intimately understand the current process (experts – could be at any level in the organization); some individuals who actively use the process and work closely with customers; some technical wizards; some individuals who are completely objective toward the process and outcome (consultants may fall into this category); customers of the process (when possible) and suppliers (those people who are involved with the process) and some individuals who are not familiar with the process (someone who brings a fresh perspective and outlook to the team). In the team selection criteria, they indicated that when selecting team members, one should make sure that they are: creative and open minded, good team players and well respected among peers, stakeholders, and other business leaders.

2.5 Maintenance Funds and Performance of Water Projects

Financial sustainability means financial continuity and security (Myers, 2014). The organization and its core work will not collapse if external funding is withdrawn (Norton, 2011). In practice, organizations which fulfill these definitions first have a diversified funding base which emphasizes on the importance to have a financing strategy which produces several different sources of income. It does not make good sense to put “all your eggs in one basket”. To rely on just one or two donors for your income makes you vulnerable to external threats. Diversification means securing funds from a wide base that includes sources such as the local business community, national and local government and the general public – and not just from external, institutional donors such as USAID.

Second availability of unrestricted funds are far much better than restricted funds of which an organization is legally obliged to use them for the reason that the donor gave them to you. In contrast, unrestricted funds can be used for anything at all that helps you to achieve your mission. The more unrestricted funds you have, the more freedom of action you have. You can choose and change the projects that you want to run and you can cover costs that donors are reluctant to fund, like core costs (Fowler, 2010). We have to look beyond institutional donors for sources of unrestricted funds, for example: membership fees, advertising income, fee income, general appeals and bank interest. Having a regular source of unrestricted income is essential for the next feature of a financial sustainable NGO.

Third is availability of financial reserves which are resources that an organization builds up during its lifetime (from surpluses of unrestricted income) and puts aside to meet unexpected events in the future. These funds are sometimes kept in a special reserves bank account and are shown separately on the annual financial statements. Building up reserves has a number of obvious advantages for NGOs (Tyler, 2014). It reduces their dependence on donors, helps during cash flow shortages and helps to withstand financial shocks and unplanned expenditure.

Finally Strong stakeholder relationships dictate the position an organization will be in. True partnerships occur when back-up and financial support is provided in the good times and the bad times. The key to financial sustainability is to develop your relationships with an eye to the future as well as meeting today’s needs. This means building the confidence of donors over time. For instance, it may not be appropriate to press them for funds today, if you believe that you might win more funds from them in the future. It is a mistake to take funds

for projects that you cannot deliver, just because the money is available. This will harm your relationship with the donor and reduce the chance of winning funds that you really need next year or the year afterwards (Myers, 2014).

The project maintenance fund enables host-country project owners to oversee their own development initiatives. In doing so, it assists them to bring their projects to successful completion as rapidly as possible, with the greatest long-term sustainability, and with the greatest benefit for the ultimate host country stakeholders. Project development process associates provide professional service strategies of the very highest standards, individually and specifically rendered on a case-by-case basis. The primary focus is on ensuring maximum appropriateness and effectiveness for addressing the need of the ultimate local stakeholders, while simultaneously contributing to the harmony of their local cultural, social, and natural environments. Project development process associates, neither as individuals nor as organizations, have any intrinsic interest in either the implementation or the outcome of the project development process, other than the interest they share in common with their host country Project Clients, their associates, and their stakeholder constituencies (Nyong & Kanaroglou, 2011). Project development process associates' self-evaluation of their service delivery and their organizational efficacy is based solely on Project Client inputs reflecting the degree and the extent of satisfaction with project development efforts on their behalf.

Project development represents the host-country project client, by proxy through its authorization, as its exclusive agent for coordinating and overseeing its interests on its behalf with all relevant institutions, organizations, and businesses throughout the project development process. The project development Process offers host country Project Clients the most effective mechanism for maintaining control over their development initiatives (Tyler, 2014). The key to this is the Project Client's potential prerogative to determine and sole source all services and products for the project development process. All international development funding agencies require an open-bid solicitation process for the selection of potential contractors and suppliers in order to ensure equitable public access to funding agency-sponsored commerce. The project development Process is able to satisfy this universal requirement with its associated Vendor Information Services Program (VISP) and the Professional Executive and Engineer Resource (PEER). VISP provides a comprehensive database of technology service and product providers targeting international commerce, who have been pre-qualified for inclusion in donor funded international development projects.

PEER provides a database of individual professionals and operates in the same manner as VISP.

2.6 Theoretical Orientation

This section discusses the theoretical foundation on which the study is anchored. The study was grounded on the community participation theory, institutional theory and resource based view theory.

2.6.1 Community Participation Theory

Cohen and Uphoff's (1987) comprehensive model regarding people's participation is chosen to analyze the participation of community level people in development projects in Bangladesh. Besides Cohen and Uphoff's (1987) model, Community Participation Theory propounded by Khwaja (2014) is also consulted and used for the present study. The community participation theory assumes that community participation has a real influence on the decision, that is: greater community participation makes it less likely that the decision is determined by the external agency (Khwaja, 2014). This assumption and found that it is indeed true higher community participation in a decision also implies a lower likelihood that the external organization rather than the community is identified as the main decision maker.

Participation of people is of utmost essence while identifying a project. If their participation is ensured, they can best fit the need, nature and type of project according to their own need as well as challenges and constrains. Moreover, their participation in project identification imbibes the sense of ownership among them which will, help during the implementation of the project in question (Harvey and Reed 2013).

In community participation theory, focuses are given on the participation of beneficiaries, and not that of government personnel in the development project. The joint or collaborative involvement of beneficiaries in groups is a hallmark of community participation; and that community participation refers to a process and not a product in the sense of sharing project benefits. Community Participation theory stands for the general assumption that the higher the community participation in a decision, the lower the likelihood of the interferences of external organizations on that decision (Munguti 2014).

This theory addresses community participation that highly influences acceptance and performance of project. Therefore it is relevant to this study in understanding influence of

community participation on performance of water projects in Ewaso Ng'iro North borehole projects in Isiolo County.

2.6.2 Institutional Theory

Institutional theory is a predominant theoretical tool within the field of organization studies (Suddaby, 2010). Institutional theory has its roots in the scholarly understanding of institutions as monolithic, permanent structures invested with socio-cultural meaning, and governing social behaviors. It was initially used in the 1970s to study what were perceived by scholars as the institutional qualities of organizations: their stability, and the rule-like structures they exhibit which shape and constrain members' behaviors (Scott, 2008). Institutional theory was subsequently used to examine how organizations and their behaviors acquired myths and meanings which contribute to formal organizational structure, but which are not able to be understood as the products of organizations' practical demands (ibid). The scope of institutional theory has steadily expanded to include its application to the study of how, through institutional pressures, organizations come to resemble each other, how individuals exercise power within institutional environments, and how institutions change. Institutional theorist Roy Suddaby even goes so far as to say that institutional theory has become ubiquitous within organization studies, being applied by default to any and all questions within the field (Suddaby, 2010).

This theory examines how organizations and their behaviors acquired myths and meanings which contribute to formal organizational structure influence performance. Therefore it is relevant to this study in looking at influence of project management on performance of water projects in EwasoNg'iro North borehole projects in Isiolo County.

2.6.3 Resource Based View

The currently dominant view of resource-based theory is based on the concept of economic rent and the view of the company as a collection of capabilities. This view of strategy has a coherence and integrative role that places it well ahead of other mechanisms of strategic decision making (Kay, 2015). The resource-based view (RBV) offers critical and fundamental insights into why firms with valuable, rare, inimitable, and well organized resources may enjoy superior financial performance (Barney & Arkan, 2011).

The main contribution of the resource-based view lies in the notion of competitive advantage. The resource-based view of the firm, which envisions firms as a bundle of resources, is probably the dominant theory for explaining differences in performance among firms today

(Barney and Arkan, 2011). Resources have been variously defined by RBV theorists, but can include financial capital, assets, human skills/knowledge, organizational processes, and technologies (Carmeli, 2010). Despite the varied positioning of early resource-based contributions, each focused on the distinctive resource profiles of heterogeneous firms and the question of why some firms consistently outperform others. A portion of the most important of the research to shape resource based thought is rooted in the early research on distinctive competencies, Ricardian economics, and the theory of firm growth proposed by Penrose (1959), since concepts from that historical research influenced the fundamental assumptions of the model (Barney, 2012).

The resource-based view suggests that a firm can create sustainable competitive advantage through developing its unique resources and capability (Barney & Arkan, 2011). The difference between providing short-term competitive advantage and that which is sustainable resides in the notion that these resources are heterogeneous in nature and not perfectly mobile (Barney, 2012). Managers are not static in the RBV, but instead they are called upon to structure, bundle, and leverage their valuable resources in unique ways to maximize their contribution to providing sustained advantage (Sirmon, Hitt & Ireland, 2013).

Literature on the resource-based view already provides resources which contribute to the formulation of sustainability-related strategies, such as continuous improvement (Christmann, 2010), a shared vision within the church based organizations, high order learning, relationships with external stakeholders stakeholder involvement green supply chain management practices (Rao and Holt, 2015), international experience, working capital management skills, organizational slack and political management capabilities However, this literature emphasizes how these resources affect an organization's environmental or social performance and ultimately its financial sustainability. According to the resource based view, firms should look into their internal resources, both physical and intellectual, for sources of competitive advantage (Christmann, 2010).

Building on the RBV, Hoopes, Madsen and Walker (2013) suggest a more expansive discussion of sustained differences among firms and develop a broad theory of competitive heterogeneity. The RBV seems to assume what it seeks to explain. This dilutes its explanatory power. For example, one might argue that the RBV defines, rather than hypothesizes, that sustained performance differences are the result of variation in resources

and capabilities across firms. The difference is subtle, but it frustrates understanding the Resource Based View's possible contributions (Hoopes et al., 2013).

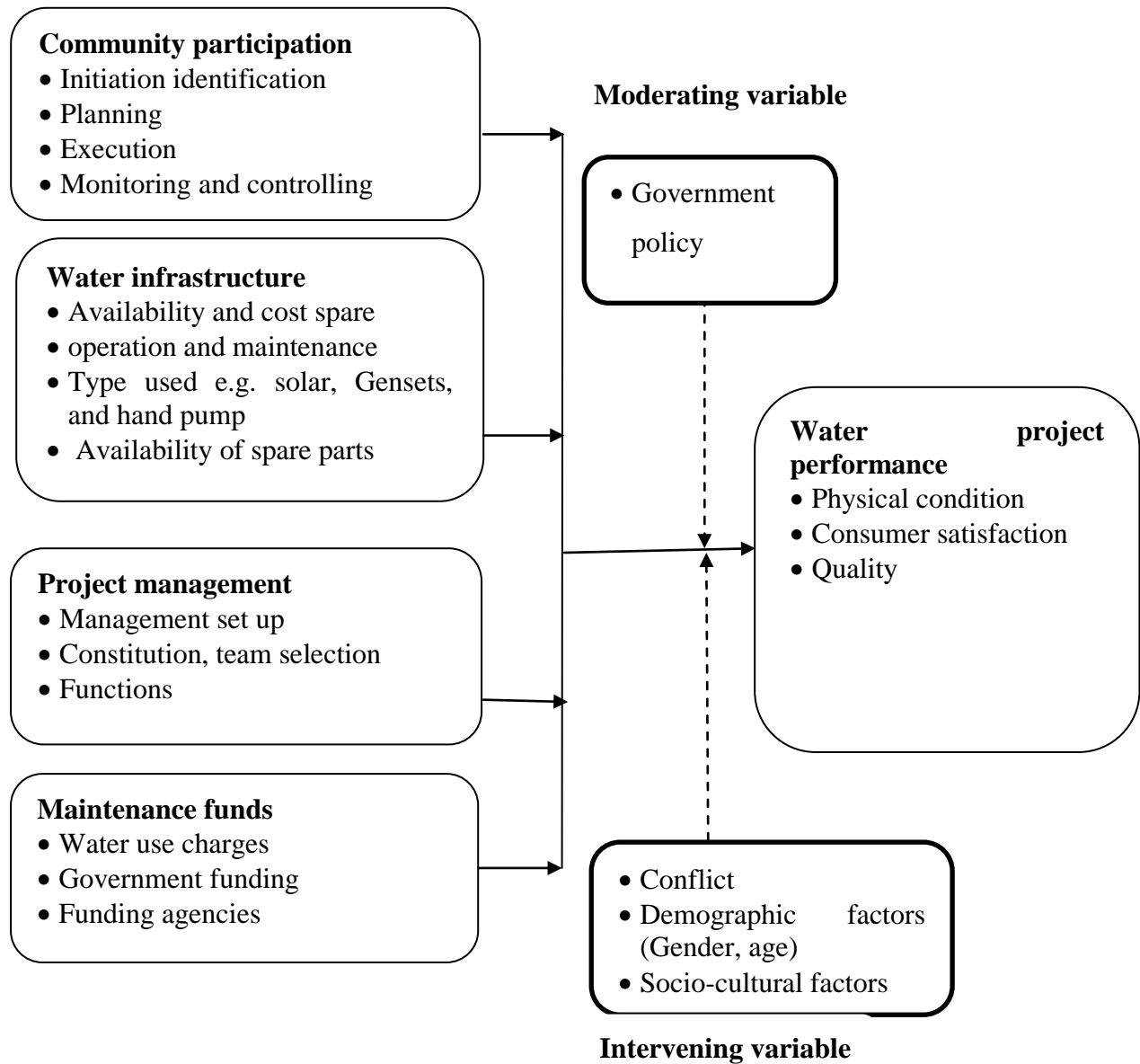
The Resource Based View's lack of clarity regarding its core premise and its lack of any clear boundary impedes fruitful debate. Given the theory's lack of specificity, one can invoke the definition-based or hypothesis-based logic any time. Again, we argue that resources are but one potential source of competitive heterogeneity. Competitive heterogeneity can obtain for reasons other than sticky resources (or capabilities) (Hoopes et al., 2013). Competitive heterogeneity refers to enduring and systematic performance differences among close competitors. The RBV uses firms' internal characteristics to explain firms' heterogeneity in strategy and performance. A firm is an organized, unique set of factors known as resources and capabilities, and RBV theory cites two related sources of advantages: resources and capabilities. Resources are a firm's accumulated assets, including anything the firm can use to create, produce, and/or offer its products to a market. Resources are eligible for legal protection (as such, firms can exercise property rights over them; can operate independently of firm members (Camisón, 2015); and intervene as factors in the production process to convert input into output that satisfies needs.

2.7 Conceptual Framework

A conceptual framework is an abstraction requesting an object, a property of an object, or a certain phenomenon. Concepts serve a number of important functions in social research. First, they are the formulation of communication. Without a set of agreed – on concepts, inter-subjective communication is impossible. Concepts are abstracted from sense impressions and are used to convey and transmit perceptions and information. To carry out this study, the following conceptual framework has been laid. The independent variables include community participation, water infrastructure, project management and maintenance. They are considered as independent variables and analysed in relation to how they influence the dependent variable which in this case is performance of Ewaso Ng'iro Borehole water project in Isiolo County. This is represented in the following schematic form below.

Independent variables

Dependent variable



2.8 Research gap

Previous studies have focused on various aspects of water projects. Kinuthia, Warui and Karanja (2009) did a study in Mbeereon the group-owned water points lack effective committees and this challenges management. Ali (2015) looked at determinants of community ownership of water projects in central division, Isiolo County. Management of water points is an important aspect of sustainable delivery of water resources to both the rural

and urban populations in Kenya. Currently, there seem to be low level of community participation of rural water supply in Kenya, leading to low levels of ownership at community level.

Rimberia (2012) studied on the determinants of water projects sustainability in Kieni East Division, Nyeri County. The sustainability rate on water projects in developing countries is alarmingly low, due to a lack of resources, capabilities and spare parts for service and maintenance. Kemuma (2015) assessed the determinants of financial sustainability in water resources management authority in the Kenyan water sector.

Most of the literature reviewed is mostly from different countries whose strategic approach and strategic footing is different from that of Kenya. Further, the studies do not centre into the issue of water projects per se. The studies done in Kenya have also not looked on the issue of factors influencing performance of water projects in the Isiolo County. Thus, there is a research gap on the determinants of community ownership of water projects in Central Division, Isiolo County which this study seeks to fill.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter is a blueprint of the methodology that will be used by the researcher to conduct the study. In this chapter the research methodology presents in the following order, research design, population and sampling, data collection methods, instruments of data collection, operationalization of variables and finally data analysis.

3.2 Research design

The study adopted a descriptive research design. A descriptive design is concerned with determining the frequency with which something occurs or the relationship between variables (Bryman & Bell, 2011). Thus, this approach is suitable for this study, since the study intends to collect comprehensive information through descriptions which were helpful for identifying variables. Bryman and Bell (2011) assert that a descriptive design seeks to get information that describes existing phenomena by asking questions relating to individual perceptions and attitudes.

3.3 Target population

The target population composed of employees in different management levels of the 12 development agencies including the NGOs, CBOs and RBOs and government officials from the Ministry of Water and Irrigation. To avoid bias from the officers and allow for comparison, the target population also included the 198 members of the management committees.

Table 3. 1: Target population

Category	Population	Percentage
Members of the management committees	198	70.5
Management staff of NGOs, CBOs and RBOs	67	23.8
Government officials from the Ministry of Water and Irrigation	16	5.7

Total	281	100.0
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3.5 Sample size and sampling procedure

Sampling is a deliberate choice of a number of people who are to provide the data from which a study draws conclusions about some larger group whom these people represent. The section focuses on the sampling size and sampling procedures.

3.3.1 Sampling Size

The sample size is a subset of the population that is taken to be representatives of the entire population (Kumar, 2012). A sample population of 162 is arrived at by calculating the target population of 281 with a 95% confidence level and an error of 0.05 using the below formula taken from Kothari (2004).

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

Where; n = Size of the sample,

N = Size of the population and given as 281,

e = Acceptable error and given as 0.05,

\hat{p} = The standard deviation of the population and given as 0.5 where not known,

Z = Standard variate at a confidence level given as 1.96 at 95% confidence level.

According to Mugenda and Mugenda (2003), from normal distribution the population proportion was estimated to be 281 and the sample size was 162 respondents as shown in the table below.

Table 3. 2: Sampling frame

Category	Population	Ratio	Sample
Members of the management committees	198	0.58	114
Management staff of NGOs, CBOs and RBOs	67	0.58	39
Government officials from the Ministry of	16	0.58	9

Total	281	162
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3.3.2 Sampling Procedures

The study selected the respondents using stratified proportionate random sampling technique. Stratified random sampling is unbiased sampling method of grouping heterogeneous population into homogenous subsets then making a selection within the individual subset to ensure representativeness. The goal of stratified random sampling is to achieve the desired representation from various sub-groups in the population. In stratified random sampling subjects are selected in such a way that the existing sub-groups in the population are more or less represented in the sample (Kothari, 2004). The study used simple random sampling to pick the respondents in each stratum.

3.5 Data collection tools

For the purpose of this study, the researcher used a semi structured questionnaire and focus group discussion as the primary data collection tool. The questionnaire was structured to include both closed, open-ended and matrix questions to allow variety. The structured questions were normally close ended with alternatives from which the respondent was expected to choose the most appropriate answer. Unstructured questions were open-ended and present the respondent with the opportunity to provide their own answers. These types of questions were easy to formulate and allow the respondent to present their feelings on the subject matter enabling a greater depth of response.

Matrix questions were also utilized. These types of questions present the respondent with a range of questions against which they are expected to respond based on a predetermined rating scale. The most commonly used is the Likert scale. These types of scales are used to measure perceptions, attitudes, values and behavior. These types of questions are popular with the respondents and researchers as they are easy to fill in, economical and provide easy comparability.

3.6 Pilot Testing

Pilot testing refers to putting of the research questions into test to a different study population but with similar characteristics as the study population to be studied (Kumar, 2012). Pilot testing of the research instruments were conducted using staff working in Ewaso Ng'iro North Borehole Projects in Isiolo County. 17 questionnaires were administered to the pilot

survey respondents who were chosen at random. After one day the same participants were requested to respond to the same questionnaires but without prior notification in order to ascertain any variation in responses of the first and the second test. This was very important in the research process because it assists in identification and correction of vague questions and unclear instructions. It is also a great opportunity to capture the important comments and suggestions from the participants. This helped to improve on the efficiency of the instrument. This process was repeated until the researcher is satisfied that the instrument does not have variations or vagueness.

3.7 Validity

Content validity which was employed by this study is a measure of the degree to which data collected using a particular instrument represents a specific domain or content of a particular concept. Expert opinion was requested to comment on the representativeness and suitability of questions and give suggestions of corrections to be made to the structure of the research tools. To establish the validity of the research, instrument the researcher sought opinions of experts in the field of study especially the lecturers in the department of project management. This helped to improve the content validity of the data that is collected. It facilitated the necessary revision and modification of the research instrument thereby enhancing validity.

3.8 Reliability

Reliability is increased by including many similar items on a measure, by testing a diverse sample of individuals and by using uniform testing procedures. The researcher intended to select a pilot group of 17 individuals from the target population to test the reliability of the research instruments. In order to test the reliability of the instruments, internal consistency techniques were applied using Cronbach's Alpha. The alpha value ranges between 0 and 1 with reliability increasing with the increase in value. Coefficient of 0.7 is a commonly accepted rule of thumb that indicates acceptable reliability (Mugenda, 2008). The pilot data was not be included in the actual study.

3.9 Data collection methods

This refers to the means the researcher used to gather the required data or information. The researcher administered the questionnaire individually to all respondents from the government agencies. The researcher exercised care and control to ensure all questionnaires issued to the respondents were received and to achieve this, the researcher maintained a register of questionnaires, which are sent, and which are received. The questionnaires were

administered using a drop and pick later method to the sampled respondents in the Ewaso Ng'iro Borehole water project.

3.10 Data analysis

Data was analyzed using Statistical Package for Social Sciences (SPSS Version 24.0). All the questionnaires received were referenced and items in the questionnaire will be coded to facilitate data entry. After data cleaning, which entails checking for errors in entry, descriptive statistics such as frequencies, percentages, mean score and standard deviation was estimated for all the quantitative variables and information presented in form of tables. The qualitative data from the open-ended questions were analyzed using conceptual content analysis and presented in prose

Inferential data analysis was done using multiple regression analysis. Multiple regression analysis was used to establish the relations between the independent and dependent variables. Multiple regressions were used because it is the procedure that uses two or more independent variables to predict a dependent variable. Since there are four independent variables in this study the multiple regression model generally assumed the following equation;

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

Where: -

Y= Ewaso Ng'iro Borehole water project performance

β_0 =constant

$\beta_1, \beta_2, \beta_3$ and β_4 = regression coefficients

X_1 = community participation

X_2 = water infrastructure

X_3 = project management

X_4 = maintenance funds

ε =Error Term

3.12 Ethical issues

Due to sensitivity of some information collected, the researcher holds a moral obligation to treat the information with utmost propriety. Since the respondents might be reluctant to disclose some information, the researcher needs to reassure the respondents of use and confidentiality of the information given.

3.10 Ethical Considerations

Considering that the research subjects in qualitative research interviewing were human beings, great care was taken to prevent harm to these people. In this research, consent was obtained, firstly, by talking to the administration, to gain their trust, support and permission to conduct the research in the organization. The nature of the research was explained to them and any questions on anonymity and confidentiality will be answered. The participants were reassured that their identities as well as the information remained confidential.

3.11 Operational definition of variables

Research Objectives	Type of Variable	Indicator	Measuring of Indicators	Data Collection Methods	Level of Scale	Tools of analysis	Types of Analysis
To determine how community participation, affect ownership of water projects in Isiolo County	Independent	Community participation	Initiation identification Planning Execution Monitoring and controlling	Questionnaire,	Ordinal Nominal	Percentages Mean score	Descriptive Regression
To establish how project management affect performance of water projects	Independent	Project management	Management set up Constitution, team selection Functions	Questionnaires	Ordinal Nominal	Percentages Mean score	Descriptive Regression

To assess the influence of Water infrastructure used on performance water projects	Independent	Water infrastructure	Availability and cost spare operation and maintenance Type of technology	Questionnaire	Ordinal Nominal	Percentages Mean score	Descriptive Regression
To assess the influence of maintenance fund used on performance water projects	Independent	Maintenance fund	Water use charges Government funding Funding agencies	Questionnaire	Ordinal Nominal	Percentages Mean score	Descriptive Regression

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION OF FINDINGS

4.1 Introduction

This chapter contains the results of the study and the analysis from the data collected from the respondents. The sections discussed include; the response rate, reliability analysis, demographic information, factors influencing performance of water projects and multiple regression analysis.

4.2 Response Rate

There were 114 respondents who returned the questionnaire out of the 162-questionnaire sampled and distributed implying a response rate of 70.37 percent. According to Lockwood (2014), a sample response rate of 60 percent and above is good.

Table 4. 1: Response Rate

Total Questionnaires administered	Filled questionnaires	Response Rate.
162	114	70.37%

4.3 Reliability Analysis

To measure the reliability of the gathered data Cronbach's alpha was applied. Cronbach's alpha is a coefficient of reliability that gives unbiased estimate of data generalizability (Zinbarg 2005). An alpha coefficient of 0.70 or higher indicates that the gathered data are reliable and are relatively high internal consistency and can be generalized to reflect opinions of all respondents in the target population (Zinbarg 2005).

Table 4. 2: Reliability Analysis

	Cronbach's Alpha	Reliability	Decision
Community Participation	.731	Reliable	Accepted
Water Infrastructure	.788	Reliable	Accepted
Project Management	.813	Reliable	Accepted
Maintenance Funds	.706	Reliable	Accepted

Table 4.2 shows that project management was more reliable (0.813) followed by water infrastructure (0.788) then community participation (0.731) while maintenance funds (0.706) was the least. This shows that all the variables were reliable and were accepted.

4.4 Demographic Information

The demographic information reveals data related to respondent's gender, area of work, period in which they have been working with Ewaso Ng'iro North Borehole Projects in Isiolo County, highest level of education and age bracket.

4.4.1 Gender

It was important to establish the gender of the respondents to reveal whether the study was skewed towards one gender.

Table 4. 3: Gender

	Frequency	Percent
Male	68	59.6
Female	46	40.4
Total	114	100

Gender characteristic of the respondents showed that, 59.6% of the respondents were male while 40.4% were female. This implies that the study was not biased since it considered all the management employees irrespective of gender and obtained information concerning the subject under study.

4.4.2 Area of Work

The study further found that it was important to explore the respondents' area of work and ascertain whether they could comprehend the subject under study based on their area of work.

Table 4. 4: Area of Work

	Frequency	Percent
Members of the management committees	62	54.4
Management staff of NGOs, CBOs and RBOs	36	31.6
Government officials from the Ministry of Water and Irrigation	16	14
Total	114	100

From the findings, most of the respondents were members of the management committees as illustrated by 54.4%. Others indicated that they were management staff of NGOs, CBOs and RBOs as shown by 31.6% and government officials from the ministry of water and irrigation as shown by 14%. This shows that majority of the respondents could understand the subject under the study.

4.4.3 Period of Working with Ewaso Ng'iro North Borehole Projects

The study determined the period in which the respondents had been working with Ewaso Ng'iro North Borehole projects in order to ascertain the extent to which their responses could be relied upon to make conclusions on the study problem.

Table 4. 5: Period of Working with Ewaso Ng'iro North Borehole Projects

	Frequency	Percent
Less than 3 years	18	15.8
3 to 9 years	47	41.2
9 to 12 years	36	31.6
Above 12 years	13	11.4
Total	114	100

The study findings show that, 41.2% of the respondents indicated that they have been working for 3 to 9 years. Other 31.6% of the respondents indicated that they have been working for 9 to 12 years. Further 15.8 % of the respondents indicated that they have been working for less than 3 years while 11.3% of the respondents indicated they have been working with Ewaso Ng'iro North Borehole Projects in Isiolo County for more 12 years. This implies that with Ewaso Ng'iro North Borehole Projects composed of experienced management staff who could comprehend the subject under study.

4.4.4 Highest Level of Education

It was important to establish the education level held by the study respondents in order to ascertain if they were equipped with relevant information on performance of water projects as well as the factors affecting it.

Table 4. 6: Highest Level of Education

	Frequency	Percent
Certificate	29	25.4
Diploma	27	23.6
Degree	50	43.9
Masters	8	7
Total	114	100

An analysis of the level of education of the respondents showed that, most of the respondents have degree as their highest level of education (43.9%). Others respondents were certificate

holders (25.4%), diploma holders (20.2%) and master's holders (75). This reveals that most of the respondents could comprehend the subject under study.

4.4.5 Age Bracket

Again, the respondents were requested about their age. The table 4.7 presents their responses.

Table 4. 7: Age Bracket

	Frequency	Percent
20-30 yrs	21	18.4
31-40 yrs	23	20.2
41-50 yrs	62	54.4
51 – 60 yrs	8	7
Total	114	100

Majority of the respondents were aged between 41 and 50 years (54.4%). It also reveals that other respondents were aged between 31 and 40 years (20.2%), were aged between 20 and 30 years (18.4%) while 7% indicated the age between 51 and 60 years. This reveals that most of water projects management team in Isiolo County is composed of relatively young people who could understand the information the researcher sought.

4.5 Factors Influencing Performance of Water Projects

This section presents the study findings on community participation, water infrastructure, project management, maintenance funds and performance of water projects in Ewaso Ng'iro north in relation to the study objectives.

4.5.1 Community Participation

Under this, the respondents were requested to tell the extent to which community participation affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County.

Table 4. 8: Extent of Community Participation Effect

	Frequency	Percent
Low extent	2	1.8
Moderate extent	28	24.6
Great extent	84	73.7
Total	114	100

From the findings, majority of the respondents indicated that community participation affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent(73.7%). Further the respondents indicated that community participation affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in moderate extent(224.6%) while 1.8% indicated low extent. This shows that community participation greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County.

Respondents were also asked to indicate the extent to which various aspects of Community Participation affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County. The results are presented in table 4.9.

Table 4. 9: Extent of Effect of Various Aspects of Community Participation

	Mean	Std. Deviation
Initiation identification	4.2632	0.7046
Planning	4.1053	0.8557
Execution	4.3596	0.6398
Monitoring and controlling	3.4737	0.5677
Decision making	2.9912	0.6976
Locally available materials	3.9123	0.8154
Financial support	3.1053	0.5544
Selection of sites for water facilities	3.5614	0.5650

The results reveal that execution influences performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent (Mean=4.3596), that initiation identification affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent (Mean=4.2632) and that planning affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent (Mean=4.1053). The study findings also showed that that locally available materials affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent (Mean=3.9123) and that selection of sites for water facilities affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent (Mean=3.5614). The study also showed neutrality on the statements that monitoring and controlling fairly affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent (Mean=3.4737), that financial support affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent

(Mean=3.1053) and that decision-making affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent (Mean=2.9912).

4.5.2 Water Infrastructure

The respondents were asked to indicate the extent to which water infrastructure affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County. Their opinions were presented in table 4.10.

Table 4. 10: Extent of Water Infrastructure influence performance water projects

	Frequency	Percent
Moderate extent	46	40.4
Great extent	53	46.5
Very great extent	15	13.2
Total	114	100

Most of the respondents indicated that to a greater extent, water infrastructure affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County as illustrated by a 46.5%. Further the respondents indicated that water infrastructure affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a moderate extent as shown by 40.4% while 13.2% indicated that water infrastructure affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a very great extent. This shows that water infrastructure greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County.

The respondents also indicated the extent to which various aspects of water infrastructure affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County.

Table 4. 11: Extent of Effect of Various Aspects of Water Infrastructure

	Mean	Std. Dev.
Availability of spares	3.693	0.7772
Maintenance cost	4.0526	0.8502
Type used e.g. solar, Gensets, and hand pump	3.9561	0.8763
Operational cost	2.5526	0.5813

In table 4.10, the respondents indicated that maintenance cost affects performance of Ewaso Ng'iro North borehole projects in Isiolo County in a great extent as illustrated by a mean

score of 4.0526, that type used e.g. solar, Gensets, and hand pump affects performance of Ewaso Ng’iro North borehole projects in Isiolo County in a great extent as shown by a mean of 3.9561. It was also shown that availability of spare affects performance of Ewaso Ng’iro North borehole projects in Isiolo County in a great extent as illustrated by a mean score of 3.693 while a mean of 2.5526 indicated that operational cost affects performance of Ewaso Ng’iro North borehole projects in Isiolo County in moderately.

4.5.3 Project Management

The respondents were asked to tell the extent to which project management affects the performance of Ewaso Ng’iro North Borehole Projects in Isiolo County. Table 4.12 presents their responses.

Table 4. 12: Extent of Effect of Project Management

	Frequency	Percent
Low extent	7	6.1
Moderate extent	33	28.9
Great extent	59	51.8
Very great extent	15	13.2
Total	114	100

As per the results above, majority of the respondents indicated that project management affects performance of Ewaso Ng’iro North borehole projects in Isiolo County in a great extent as shown by 51.8%. Further the respondents indicated that project management affects performance of Ewaso Ng’iro North borehole projects in Isiolo in a moderate extent as shown by 28.9% and in a very great extent as illustrated by 13.2% while 6.1% indicated that project management affects performance of Ewaso Ng’iro North borehole projects in Isiolo County in a low extent. This implies that project management greatly affects performance of Ewaso Ng’iro North borehole projects in Isiolo County.

Again the respondents indicated the extent to which various aspects of project management affect the performance of Ewaso Ng’iro North Borehole Projects in Isiolo County. The findings are presented in table 4.13.

Table 4. 13: Extent of effect of Various Aspects of Project Management

	Mean	Std. Deviation
Management set up	4.0965	0.8619
Constitution	3.6842	0.8447
Functions	2.4912	0.5836
Team competence	4.0263	0.8669

The findings show that management set up affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent as shown by a mean score of 4.0965 and that team competence affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent as illustrated by a mean score of 4.0263. Constitution also affected the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent as depicted by a mean of 3.6842. The findings further revealed that functions affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in low extent as shown by a mean score of 2.4912.

4.5.4 Maintenance Funds

In this case the respondents were requested to indicate the extent to which maintenance funds affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County. The respondents' opinions were presented below in table 4.14.

Table 4. 14: Extent of Effect of Maintenance Funds

	Frequency	Percent
Moderate extent	26	22.8
Great extent	73	64
Very great extent	15	13.2
Total	114	100

The findings in table 4.13, shows that most of the respondents indicated that maintenance funds affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent (64%). Other respondents indicated that maintenance funds affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a moderate extent (22.8%) while 13.2% indicated that maintenance funds affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a very great extent.

The respondents indicated the extent to which various aspects of maintenance funds affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County. Table 4.15 presents their opinions.

Table 4. 15: Extent of Effect of Various Aspects of Maintenance Funds

	Mean	Std. Deviation
Water use charges	2.5175	0.6814
Government funding	3.7281	0.7321
Funding agencies	4.307	0.6929
Budgeting	3.7281	0.6820

The study results made it clear that funding agencies greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County (Mean=4.307) and that government funding greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County (Mean=3.7281). Further it was indicated that budgeting greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County (Mean=3.7281) and that water use charges moderately affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County (Mean=2.5175).

4.5.5 Performance of Ewaso Ng'iro North Borehole Projects

Finally, the respondents were asked to rate various aspects of performance of Ewaso Ng'iro North Borehole Projects using a likert scale of 1-5 and tell their extent of their trend. Table 4.16 shows the trend findings.

Table 4. 16: Trend of Various Aspects of Performance

	Mean	Std. Dev.
Physical condition	4.2544	0.8499
Consumer satisfaction	3.8596	0.79687
Quality	3.1754	0.68156
Timely completion	4.0175	0.83064

As per the results, it was revealed that physical condition has improved (Mean=4.2544). It was also revealed that timely completion has also improved (Mean=4.0175) and that consumer satisfaction has improved as shown by an average of 3.8596. However the respondents indicated that quality has been constant (Mean=3.1754).

4.6 Multiple Regression Analysis

Multiple regression analysis was conducted to test the effect of the community participation, water infrastructure, project management and maintenance funds on the performance of water projects in Ewaso Ng'iro north borehole projects, Isiolo County, Kenya.

Table 4. 17: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.863	0.745	0.736	1.655

Table 4.17 shows the model summary of regression analysis. R square also called the coefficient of determination, shows how the performance of water projects in Ewaso Ng'iro north borehole projects varied with community participation, water infrastructure, project management and maintenance funds. R square value indicates that 73.6% variance in performance of water projects in Ewaso Ng'iro north borehole projects is explained by factors of community participation, water infrastructure, project management and maintenance funds.

Table 4. 18: ANOVA results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	896.68	4	224.170	79.638	0.000
	Residual	306.82	109	2.815		
	Total	1203.5	113			

The study used Analysis of Variance (ANOVA) as shown in table 4.18, to establish the significance of the regression model. In this model the f-significance value of $p = 0.000$ is less than the critical value (alpha) α of 0.05. Therefore the model is statistically significant in predicting the relationship between the independent variables with the dependent variable, $F=79.638 > 5.625$, $p=0.000 < 0.05$.

Table 4. 19: Regression Coefficients

Model	Unstandardized		Standardized	t	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
(Constant)	0.924	0.213		4.338	0.000
Community Participation	0.833	0.202	0.616	4.124	0.000
Water Infrastructure	0.632	0.214	0.545	2.953	0.005
Project Management	0.717	0.203	0.443	3.532	0.001
Maintenance Funds	0.563	0.246	0.501	2.289	0.020

Based on the output in table 4.16, the following equation was established:

$$Y = 0.924 + 0.833X_1 + 0.632X_2 + 0.717X_3 + 0.563X_4$$

The beta coefficient is used to determine independent variables that have the most influence on the dependent variable (Hair et al., 2006). The regression equation indicates that holding all factors (community participation, water infrastructure, project management and maintenance funds) constant, performance of water projects in Ewaso Ng'iro north borehole projects, Isiolo County, Kenya was 0.924. The study also revealed that taking all other independent variables at zero, a unit increase in the community participation would lead to a 0.833 increase in performance of water projects in Ewaso Ng'iro north borehole projects. Community participation was found to be significant since $0.00 < 0.05$. This agreed with Katz and Sara (2008) who argued that the existence of a formal community organization that operates the system affects the overall sustainability of a water project, showing that it is significantly lower in communities that lacked such organizations.

The findings also showed that a unit increase in water infrastructure would lead to a 0.632 increase in the scores of performance of water projects in Ewaso Ng'iro north borehole projects. Water infrastructure was significant since $0.005 < 0.05$. This was similar to Harvey and Reed (2007) who argues that participation can take different forms, including the initial expression of the demand for water, the selection of technology, the provision of labour and local materials, a cash contribution to the project costs, the selection of the management type and even the water tariff.

Further, the findings show that a unit increase in the scores of project management would lead to a 0.717 increase in the scores of performance of water projects in Ewaso Ng'iro north borehole projects. Project management was also significant since $0.001 < 0.005$. This concurs with Deverill et al., (2012) who argue that having a clear vision, realistic objectives and identified actions is another factor that is important in enhancing ownership.

The study also found that a unit increase in the scores of maintenance funds would lead to a 0.563 increase in the performance of water projects in Ewaso Ng'iro north borehole projects. This variable was significant since $0.020 < 0.05$. This corresponds to Nyong and Kanaroglou (2011) who said that project development process associates, neither as individuals nor as organizations, have any intrinsic interest in either the implementation or the outcome of the project development process, other than the interest they share in common with their host country project clients, their associates, and their stakeholder constituencies.

Finally, community participation had the greatest effect on the performance of water projects in Ewaso Ng'iro north borehole projects, followed by project management then water infrastructure while maintenance funds had the least effect to the performance of water projects in Ewaso Ng'iro north borehole projects. All the variables were significant (p-values < 0.05).

CHAPTER FIVE

SUMMARY, CONCLUSIONS, DISCUSSIONS AND RECOMMENDATIONS

5.1 Introduction

This part summarizes findings of the study from the research carried out and gives a discussion of each variable. It gives the conclusions drawn thereof after the analyses. The chapter gives proposals for change of the study and suggestions for future research.

5.2 Summary of Findings

Under this section, a brief summary of the study findings based on the four independent variables was presented. It focused on the effect of community participation, water infrastructure, project management, maintenance funds on the performance of water projects in Ewaso Ng'iro north.

5.2.1 Community Participation

Under this, the study aimed at determining how community participation affect performance of Ewaso Ng'iro North borehole projects in Isiolo County and found that it greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County. It was revealed that execution affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent, that initiation identification affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent and that planning affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent. Further, it was revealed that locally available materials affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent and that selection of sites for water facilities affect performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent. However it was revealed that monitoring and controlling affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent, that financial support affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent and that decision making affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent.

5.2.2 Water Infrastructure

Further the study sought to establish how water infrastructure affects performance of Ewaso Ng'iro North borehole projects and found that it greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County. The study indicated that maintenance cost

affects performance of Ewaso Ng'iro North borehole projects in Isiolo County in a great extent, that type used e.g. solar, Gensets, and hand pump affects performance of Ewaso Ng'iro North borehole projects in Isiolo County in a great extent. Further the study indicated that availability of spare affects performance of Ewaso Ng'iro North borehole projects in Isiolo County in a great extent while operational cost were found to affect performance of Ewaso Ng'iro North borehole projects in Isiolo County in moderately.

5.2.3 Project Management

In this case the study project management greatly affects performance of Ewaso Ng'iro North borehole projects in Isiolo County. The findings show that management set up affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent and that team competence affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent. Further the findings show that constitution affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent. However the findings revealed that functions affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in low extent.

5.2.4 Maintenance Funds

Further the study found that maintenance funds greatly influences performance of Ewaso Ng'iro North borehole projects in Isiolo County. From the findings, the respondents indicated that funding agencies greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County and that government funding greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County. Further the respondents indicated that budgeting greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County and that water use charges moderately affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County.

5.3 Discussion

5.3.1 Community Participation

Under this, the study found that community participation greatly influences performance of Ewaso Ng'iro North borehole projects in Isiolo County. It was revealed that execution affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent, that initiation identification affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent and that planning affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent. These findings were in line with Katz

and Sara (2008) who argued that the existence of a formal community organization that operates the system affects the overall sustainability of a water project, showing that it is significantly lower in communities that lacked such organizations.

Further, it was revealed that locally available materials affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent and that selection of sites for water facilities affect performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent. These are similar to Isham and Kahkonen (2012) who found that well-designed and well-constructed water services are two significant factors for effective community-based approaches.

However it was revealed that monitoring and controlling affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent, that financial support affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent and that decision making affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent. This corresponds to Wambugu (2009) who claim that the Water Project in Mwitha Primary School, Sikhendu on the slopes of Mount Elgon has given Inter-christian Fellowships' Evangelical Mission (IcFEM) the opportunity to develop a locally-run Borehole Management Committee to manage the future work relating to the borehole planned for Mwitha Primary School.

5.3.2 Water Infrastructure

Further the study sought to establish how water infrastructure affects performance of Ewaso Ng'iro North borehole projects and found that it greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County. The study indicated that maintenance cost affects performance of Ewaso Ng'iro North borehole projects in Isiolo County in a great extent, that type used e.g. solar, Gensets, and hand pump affects performance of Ewaso Ng'iro North borehole projects in Isiolo County in a great extent. These were in line with Harvey and Reed (2007) who argues that participation can take different forms, including the initial expression of the demand for water, the selection of technology, the provision of labour and local materials, a cash contribution to the project costs, the selection of the management type and even the water tariff.

Further the study indicated that availability of spare affects performance of Ewaso Ng'iro North borehole projects in Isiolo County in a great extent while operational cost were found to affect performance of Ewaso Ng'iro North borehole projects in Isiolo County in

moderately. These were similar to Deverill et al., (2012) who claim that the principal of offering communities a range of choices of technology should be planned carefully if it is to be successfully put into practice.

5.3.3 Project Management

In this case the study project management greatly affects performance of Ewaso Ng'iro North borehole projects in Isiolo County. The findings show that management set up affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent and that team competence affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent. These correlates with Deverill et al.,(2012) who argue that having a clear vision, realistic objectives and identified actions is another factor that is important in enhancing ownership.

Further the findings show that constitution affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in a great extent. However the findings revealed that functions affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County in low extent. This concurs with Kumar (2012) who asserts that the main indicators of likely success relate to the leadership and the capacity of the management team.

5.3.4 Maintenance Funds

Further the study found that maintenance funds greatly influences performance of Ewaso Ng'iro North borehole projects in Isiolo County. From the findings, the respondents indicated that funding agencies greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County and that government funding greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County. These were in line with Fowler, (2010) who said that the more unrestricted funds you have, the more freedom of action you have. You can choose and change the projects that you want to run and you can cover costs that donors are reluctant to fund, like core costs.

Further the respondents indicated that budgeting greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County and that water use charges moderately affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County. These correlates with Nyong and Kanaroglou (2011) who said that project development process associates, neither as individuals nor as organizations, have any intrinsic interest in either the implementation or the outcome of the project development process, other than the interest

they share in common with their host country project clients, their associates, and their stakeholder constituencies.

5.4 Conclusion

The study concluded that community participation greatly and positively affects performance of Ewaso Ng'iro North borehole projects in Isiolo County. The study deduced that execution affects, initiation identification and planning greatly affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County. Further, it was also revealed that locally available materials and selection of sites for water facilities greatly affect performance of Ewaso Ng'iro North Borehole Projects in Isiolo County. The study also revealed that monitoring and controlling, that financial support and decision making moderately affects performance of Ewaso Ng'iro North Borehole Projects in Isiolo County.

Further the study established that water infrastructure positively affects performance of Ewaso Ng'iro North borehole projects. The study deduced that maintenance cost, type used e.g. solar, Gensets, and hand pump greatly affects performance of Ewaso Ng'iro North borehole projects in Isiolo County in a great extent. Further the study deduced operational costs were found to moderately affect performance of Ewaso Ng'iro North borehole projects in Isiolo County.

Further study concluded that project management greatly and positively affects performance of Ewaso Ng'iro North borehole projects in Isiolo County. The study deduced that management set up and team competence greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County. Further it was deduced that constitution greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County.

The study also concluded that maintenance funds greatly influences performance of Ewaso Ng'iro North borehole projects in Isiolo County. The study deduced that funding agencies greatly and government funding greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County. Further the study deduced that budgeting greatly affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County and that water use charges moderately affects the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County.

5.5 Recommendations

From the findings and conclusions, the study recommends that;

1. The Isiolo County Government and stakeholders should allocate funding towards the development of water infrastructure especially in construction of new pipeline extensions and constructing of new water points in Ewaso Ng'iro North. The use of solar energy as an option to replace the diesel generators or a hybrid system should be explored.
2. More local technicians should be trained on operation and maintenance of generators and hand pumps. The water management committees should be trained on financial management and record keeping. This should be done by the Ministry of Environment, Water and Natural resources.
3. When water management committee are being formed, and registered, participation and membership of women should be encouraged to avoid gender discrepancy. This will ensure that everyone in the community is involvement in the water projects.
4. Strict guidelines should be set to govern how the management team carries out its activities in relation to the water projects. This will encourage transparency in leadership as well as better financial management resulting to a improved performance of water projects.

5.6 Recommendations for Further Studies.

The researcher recommends further studies on;

1. Factors influencing performance of water projects in arid and semi-arid areas in other regions so as to allow for generalization of Factors influencing performance of water projects in arid and semi-arid areas in Kenya.
2. The influence of social cultural factors on long term sustainability of water projects. Especially age, gender and education levels of members of water management committees.

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APPENDICES

Appendix I: Letter of Transmittal

Maimuna Mohamud

P.O Box 5848-00200.

NAIROBI.

Dear Sir/ Madam,

RE: ACADEMIC RESEARCH PROJECT

I am a Master of Arts in Project Planning and Management student at University of Nairobi. I wish to conduct a research entitled factors influencing performance of water projects in arid and semi-arid areas. A case of Ewaso Ng'iro North Borehole Projects, Isiolo County, Kenya. A questionnaire has been designed and will be used to gather relevant information to address the research objective of the study. The purpose of writing to you is to kindly request you to grant me permission to collect information on this important subject from your organization.

Please note that the study will be conducted as an academic research and the information provided will be treated in strict confidence. Strict ethical principles will be observed to ensure confidentiality and the study outcomes and reports will not include reference to any individuals.

Your acceptance will be highly appreciated.

Yours faithfully,

Maimuna Mohamud

L50/84725/2016

Appendix II: Research Questionnaire

This questionnaire is to collect data for purely academic purposes. The study seeks to investigate the factors influencing performance of water projects in arid and semi arid areas. A case of Ewaso Ng'iro North Borehole Projects, Isiolo County, Kenya. All information will be treated with strict confidence. Do not put any name or identification on this questionnaire.

Answer all questions as indicated by either filling in the blank or ticking the option that applies.

SECTION A: DEMOGRAPHIC INFORMATION

Please tick (✓) appropriate answer

1) Please indicate your gender: Female [] Male []

2) Please indicate your area of work

Members of the management committees []

Management staff of NGOs, CBOs and RBOs []

Government officials from the Ministry of Water and Irrigation []

3) For how long have you been working with Ewaso Ng'iro North Borehole Projects in Isiolo County?

Less than 3 years [] 3 to 9 years []

9 to 12 years [] Above 12 years []

4) State your highest level of education

Certificate [] Diploma [] Degree [] Masters [] PhD []

Others (Specify) -----

5) Please Indicate your age bracket 20-30 yrs [] 31-40 yrs []

41-50 yrs [] 51 – 60 []

SECTION B: COMMUNITY PARTICIPATION

1) To what extent does Community Participation affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County?

Very low extent [] Low extent []

Moderate extent [] Great extent []

Very great extent []

2) To what extent do the following aspects of Community Participation affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County?

3) 1-Very low extent, 2- Low extent, 3- Moderate extent, 4-Great extent, 5-Very great extent

		1	2	3	4	5
1.	Initiation identification					
2.	Planning					
3.	Execution					
4.	Monitoring and controlling					
5.	Decision making					
6.	Locally available materials					
7	Financial support					
8	Selection of sites for water facilities					

4) In your view how do the above aspects of **Community Participation** affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County?

.....

SECTION C: WATER INFRASTRUCTURE

5) To what extent does **water infrastructure** affect the performance of Ewaso Ng’iro North Borehole Projects in Isiolo County?

Very low extent [] Low extent []

Moderate extent [] Great extent []

Very great extent []

6) To what extent do the following aspects of **water infrastructure** affect the performance of Ewaso Ng’iro North Borehole Projects in Isiolo County?

7) 1-Very low extent, 2- Low extent, 3- Moderate extent, 4-Great extent, 5-Very great extent

		1	2	3	4	5
1.	Availability of spare					
2.	Maintenance cost					
3.	Type used e.g. solar, Gensets, and hand pump					
4.	Operational cost					

8) In your view how do the above aspects of **water infrastructure** affect the performance of Ewaso Ng’iro North Borehole Projects in Isiolo County?

.....

.....

.....

SECTION D: PROJECT MANAGEMENT

9) To what extent does **project management** affect the performance of Ewaso Ng’iro North Borehole Projects in Isiolo County?

10) Very low extent [] Low extent []

Moderate extent [] Great extent []

Very great extent []

11) To what extent do the following aspects of **project management** affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County?

12) 1-Very low extent, 2- Low extent, 3- Moderate extent, 4-Great extent, 5-Very great extent

		1	2	3	4	5
1.	Management set up					
2.	Constitution					
3	Functions					
4	Team competence					

13) In your view how do the above aspects of **project management** affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County?

.....
.....
.....
.....

SECTION E: MAINTENANCE FUNDS

14) To what extent does a **maintenance fund** affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County?

Very low extent [] Low extent []

Moderate extent [] Great extent []

Very great extent []

15) To what extent do the following aspects of **maintenance funds** affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County?

1-Very low extent, 2- Low extent, 3- Moderate extent, 4-Great extent, 5-Very great extent

		1	2	3	4	5
1.	Water use charges					
2.	Government funding					
3	Funding agencies					
4	Budgeting					

16) In your view how do the above aspects of **maintenance funds** affect the performance of Ewaso Ng'iro North Borehole Projects in Isiolo County?.....

.....

.....

.....

.....

Performance of Ewaso Ng'iro North Borehole Projects

17) What is the trend of the following aspe

18) cts of performance of Ewaso Ng'iro North Borehole Projects? Where, 5 = greatly improved, 4= improved, 3= constant, 2= decreased, 1 = greatly decreased

		1	2	3	4	5
1.	Physical condition					
2.	Consumer satisfaction					
3	Quality					
4	Timely completion					

Thank you for participating.