PERFORMANCE AND SUSTAINABILITY OF COMMUNITY WATER SUPPLY PROJECTS IN KIPKELION EAST CONSTITUENCY, KENYA

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DECLARATION

This research project is my original work and has not been presented for any award of the degree programme in any university or for other award.

Sign..........................................................Date....................................................

Registration Number: D53/CTY/PT/26255/2013

Name: Kirui Emmanuel Rutto

This research project has been submitted for examination with my approval as the university supervisor

Sign..........................................................Date....................................................

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DEDICATION

This work is dedicated to my entire family. My loving parents Hon Dr. Sammy. K. Rutto and Bornice Rutto who have sacrificed a lot to make me be what I am today. To my loving siblings, Audrey, Ibrahim, and Family friends for their constant prayers and encouragement. To my friend/mentor Professor Paul Mbugua who continues to encourage me to always work hard for my bright future.
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Similarly, my deep gratitude goes to my Father Hon Dr Sammy Rutto and Mother Mrs. Bornice Rutto for their constant encouragement to work hard and fully commit myself to this work. Finally, I thank my fellow siblings, relatives, and family friends who encouraged me throughout this period. Their understanding and support cannot be underestimated

Above all I thank the almighty God for this far he has brought me and the chance to serve him through generating knowledge.
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DEFINITION OF OPERATIONAL TERMS

**Sustainability** - Is the ability of a Project to continue in a defined behavior to deliver required objectives.

**Project Managers** - A Project Manager is the person responsible for leading a Project from its inception, execution, and completion.

**Constituency Development Funds** - Are funding arrangements that channel money from central government directly to electoral constituencies for local infrastructure projects.

**Performance** - The accomplishment of a given task measured against preset known standards of accuracy, completeness, cost, and speed.

**Operations and Maintenance** - Is a procedure that encompasses all broad spectrum of services required to assure the Projects will perform its functions.

**Strategy** - Is a Plan chosen to bring about a desired future, such as achievement of a goal or solution to a problem.

**Project** - Its series of interrelated set of activities that has a definite start and ending point.

**Project Implementation** - Is putting the Project Plan into action.

**Project Scope** - Is the description of all the activities that must be done on a Project.

**Project Management** - Is the application of knowledge, skills, tools, and techniques to Project activities to meet the Project requirements.
Recurrent Costs- Are those Costs associated with Operation, Maintenance, Repair, and Replacement of system.

Completion- Is the final stage in Project Management where a completion test is done.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>W.H.O</td>
<td>World Health Organization</td>
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<tr>
<td>O.M</td>
<td>Operation and Maintenance</td>
</tr>
<tr>
<td>U.N.D. P</td>
<td>United Nations Development Program</td>
</tr>
<tr>
<td>C.D. F</td>
<td>Constituency Development Fund</td>
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<tr>
<td>C.B. O</td>
<td>Community Based Organization</td>
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<tr>
<td>W.S. F</td>
<td>Water Supply Facility</td>
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<td>N.G. O</td>
<td>Non-Governmental Organization</td>
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<td>U. N</td>
<td>United Nations</td>
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<td>C.M.M</td>
<td>Community Management Models</td>
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<td>T.O.C</td>
<td>Theory of Constraints</td>
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<td>S.P.S. S</td>
<td>Statistical Package for Social Scientist</td>
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ABSTRACT

The key objectives of this research project was to determine the effects of performance and sustainability factors of the Community Water supply projects e.g., government funding, staff management, modern technology, Social cultural factors and other factors that are affecting the sustainability of the Water Supply Projects; It’s important to note that with the distribution of large amounts of C.D.F funds by the Kenyan government to the rural constituencies has had a positive effect on a variety of the constituencies in the country. However, many of the projects have ended up collapsing either within the project period and have not been able to proceed further after termination. This has Raised many concern in investigating the performance and sustainability of the water supply projects in Kipkelion East constituency. This research w aimed at a target population of 10 selected water supply projects. The respondents included Project Managers/Chairpersons, Vice Chairperson Treasurers, Secretaries, Community Members, Project Facilitators, and other Administrators The study design was descriptive. Stratified random sampling was used where the 10 water projects established were visited by the researcher to obtain primary data. Secondary data was obtained from past document records obtained at the Londiani CDF constituency office. The Data Collected was classified and tabulated in a systematic manner with the use of SPSS version 21 software package. Qualitative data was analyzed by making inferences from the statements made by the respondents on the questionnaires around the variables. The data used was presented by use of frequency distribution tables, percentages, Pie Charts, and Statement of Count Score Tables and explanation presented in prose. The findings of the study indicated that Staff Training, Managerial Impact, Technological, financial and social-cultural impact do influence the performance and sustainability of community water projects. The study concluded that that a good number of the water management committee members were familiar with the performance and sustainability condition of the water supply projects and hence able to give reliable information. The study recommends that Water Source Conservation Interventions such as Water Catchment areas, Rain Water harvesting, to be introduced in Water Project long term plans to meet the objective of Water Project performance and sustainability.
CHAPTER ONE: INTRODUCTION

1.1 Background of the study

The performance and sustainability of community water supply projects has been heralded as a promising direction for a variety of communities in Kenya. (Dube 2012, Harvey Reed 2004). The broad idea is to integrate the physical, social, and economic factors into a multi-faceted approach that recognizes their interrelatedness so that the surrounding community’s benefits from the water supply projects and the already existing ones are sustained over time. This integration is fundamental to definitions of sustainable water supply projects, such as those designed and managed to fully contribute to the objectives of society, now and in the future, while maintaining their ecological, environmental and hydrological integrity.

Rural water supply projects are considered sustainable when the water sources are not over exploited but naturally replenished. The community water supply projects are maintained in a condition which ensures a reliable and adequate water supply system is available to the users over a prolonged period of time” (Harvey, 2003).

More specific factors of performance and sustainability include; government funding, staff management, modern technology, Social cultural factors. Other Factors include institutional arrangements, technological advancements, natural environment, community and social aspects, financing, maintenance, training of staff, and capacity building, Various researchers have integrated two or more of these factors in sustainability of the water supply projects for example, (Marcus, 2008) found out that sustainable management of water resources is dependent on economic factors, financing, and legal regulatory frameworks. Another researcher is (Gebrehiwot’s,
2006) whose study is a bit instructive and has an integrated approach. It first examines different understandings of what “sustainability” means in relation to community-managed rural water projects. One view sees sustainability only in economic terms such as financial self-sufficiency. Another incorporates institutional factors such as the ability of government or other external agencies to provide long term management support after project completion. Gebrehiwot’s study then integrated these factors and characterized them in sustainability study in two ways: per-project and post-project analysis, and within community (capacity and education, social cohesion, fee collection) and outside community. (follow up support, skilled technicians, supportive policy environmental issues, and regular flow of clean water).

This study demonstrated that one’s view of sustainability and its determinant factors, including when and where these are implemented in the life of a project, affects sustainability outcomes.

Local participation and management are also presumed to be instrumental for sustainable Water resources (Dube 2012, Kamruzzaman et al. 2013). However, Participatory approaches do not automatically produce sustainable solutions because decisions made by a community are influenced by the community’s understanding of the issues involved (Barnes et al. 2011.)

Community participation is a prerequisite- for sustainability i.e., to achieve efficiency, effectiveness, equity and replicability but community management is not (Harvey and Reed 2006). However Local Management Development in Practice imply that community water projects also need supportive links to other institutions for ongoing management services to achieve effective performance and sustainability of the
community water projects e.g. Project Monitoring, capacity building, technical expertise, and periodic funding.

For community managed water projects to be sustainable, they require meaningful participation at all stages of the project cycle and ongoing external support long after project commissioning (Whittington et al. 2009). Most sustainability studies of community water supply projects provide only a snapshot of sustainability issues. Few examine how the factors of sustainability change over time and the implication of these changes for sustainability outcomes in the long term.

The initial conditions for sustainability assumed at project planning and design may change over time and threaten ongoing viability of a project. For example, most community managed water projects assume a constant supply of water, static water policies, and continued capacity for local management. However, water supply may be reduced due to over-extraction or climate change may affect recharge rates at the source. Water sector reforms may levy new fees or alter management support from public agencies. Local management capacity may not be sufficiently adaptable or resilient to cope with these changing conditions.

Rural areas in developing countries across the world remain severely disadvantaged without sustainable water supply projects. Only 47% of the rural population of sub-Saharan Africa has access to an improved water source (UN, 2010).

However, the challenge of rural water supply sustainability is jeopardizing progress. Sustainability of rural water supply projects relates to whether or not these services last over time (Carter, 2010) and is dependent upon numerous factors ranging from
current modern technology, C.D.F, Staff management, Social cultural factors, and other factors e.g. Spare parts availability to effective community management models (C.M.M) to finance for operation and maintenance of the Water Supply projects.

However, Kenya made large investments in water supply projects in rural areas with help/aid from external donors, Charities, and also from the N.G.Os. This was an initiative to increase the even distribution of the community water supply projects within Kipkelion east constituency. but due to inadequate management and maintenance of the rural water supply projects, some of this investments did not result in efficient and sustainable service delivery. By the early 2000’s there was widespread collapse of the already existing ones. Water supply projects operations were non-transparent, unsustainable and ill-suited to respond to consumer needs

In the last few years, there has been an upsurge in the number of large commercial farms within Kipkelion east constituency. This implied that water demand in the area had become essential for agricultural and domestic purposes. Agricultural production in the area depended largely on rainfall therefore aggregate water demand in the area increased resulting to the need of invitation of Community Water Supply Projects in the whole of Kipkelion. There has been a rise of a variety of infrastructural developments where there is the construction of new schools, hospitals public hospitals administrative offices and churches within Kipkelion east constituency which have to be near this water projects. Lifestyle changes, infrastructural development and socio-economic growth are the major reasons for the initiation of water Projects within Kipkelion East constituency.
1.2 Statement of the Problem

This Research Study examined the performance and sustainability factors of community water supply projects in Kipkelion East Constituency. Which include Managerial skills, financial resources, Modern technology, and training of staff, and other factors affecting the Community water supply projects. Findings show that after 10 years the already existing projects are at a threshold of sustainability making some to fail. Also the Changing rainfall patterns and additional withdrawals from new projects are threatening the sustainability of the available water projects to the whole community. (Harry Spaling Geoffrey Brouwer, 2012).

In the last decade, particularly in the last half of the decade, the issue of management of sustainable water supply projects has attracted the attention of the international community. Nevertheless, the issue of water resources management in the constituency focuses mainly on the performance of the water projects. Developing the capacity to engage in sustainable water projects planning from the community level to the highest national decision-making level, remains a major challenge in Kenya and many other African countries. For example, it is noted that in a variety of the Kenyan rural areas there are a number of factors rampant to sustainability of the water projects, there is inadequate capacity building processes, neglect of use of modern technology, poor management by the mangers delegated to lead the water committee, mismanagement of funds, reduced/ no training of staff and excessive reliance on public sector services.
1.3 General Objective

The main objective of this study was to assess the influence of financial resources, Managerial Skills, Social cultural factors, training of the selected staff members, and adoption of the modern technology on the project constraints.

1.4 Specific Objectives

The Specific Objectives to this study included:

1. To find out the effect of financial resources on performance and sustainability of community water supply projects in Kipkelion East Constituency Kenya.
2. To determine the effect of managerial skills on performance and sustainability of community water projects in Kipkelion East Constituency Kenya.
3. To determine the effect of social cultural factors on performance and sustainability of community water supply projects in Kipkelion East Constituency Kenya.
4. To determine the effect trained staff members on performance and sustainability of community water supply projects in Kipkelion East Constituency Kenya.
5. To find out the effect of modern technology on performance and sustainability of community water supply projects in Kipkelion East Constituency Kenya.

1.5 Research Questions

1. To what extent do financial resources influence the performance and sustainability of water supply projects?
2. To what extent does Managerial Skills influence the performance and sustainability of the water supply projects?
3. To what extent does the Socio-cultural factor influence the performance and sustainability of the water supply projects?

4. To what extent does training of staff members influence the performance and sustainability of water supply projects?

5. To what extent does the adoption of the modern technology influence the performance and sustainability of water supply projects?

1.6 Significance of the Study

The significance of this research was to disseminate important information and lessons learned from the past water supply systems as per community participation in planning, implementation and management of water supply projects. It was intended to provide reliable information that give insight on the effect of factors of sustainability of water supply projects. As per the consideration to community norms and social factors, the research was to make aware the contribution of external agencies, donors and to consider the importance of social dimension associated with community participation, management and attitude towards the essence and value of having sustainable water supply projects. Besides that, the study was meant for contributing an input towards future planning, implementation and management of new sustainable rural water supply projects.

1.7 Scope of the study

This research study was organized into four chapters where chapter one covered the background to the study, statement of the problem, General objective of the study, research questions, the significance of the study, assumptions, limitations of the study, and definition of operational terms. Chapter two covered the literature review of the
study with outlook on theoretical framework, conceptual framework and the scholarly works factors of performance and sustainability of water supply projects in rural Kenya and Developing African countries. Determinants to be studied were: financial resources, training of staff, managerial skills, social cultural factors and adoption of modern technology by the community members. Chapter three outlined the research methodology that will be employed by the study, the research design, target population, sample size, sampling design, data collection and instruments that will be used during the study, Chapter four gave the data analysis and presentation procedures.

1.8 Limitations of the Study

Limitations are an aspect of research that may influence the results of the study negatively, but over which the researcher has no control over (Mugenda and Mugenda 1999). The researcher cannot manipulate the independent variables since their manifestation has already taken place. Kipkelion East Constituency is a large area to cover hence the researcher was able to sample 10 water projects for the research study. The study was then conducted within a shorter time frame of one month which was not efficient to conduct an exhaustive study of the sustainability of the water projects. This was overcome through a drop and pick later method of the questionnaires to allow the staff complete the questionnaires during their free time. The researcher also had a single sponsor for the research study was a limiting factor hence the researcher used only what was available. The results of this study were therefore only used to depict the picture of sustainability conditions of the community water projects in Kipkelion East constituency
1.9 Assumptions to the Study

The assumption to this research study was that there were water sources available for the implementation of the water supply projects. The second assumption was that there might be resistance by from the community due to of being victimized. The third assumption was that the researcher might experience mismanagement issues by the appointed water management committee of which in turn would lead to some of the projects not achieving sustainability standards. Finally, the researcher assumed that there were enough available funds deployed by the Kenyan government in terms of Constituency Development Funds. (C.D.F)
CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction
This chapter provides background information on performance and sustainability of community water supply projects in Kenya and other African countries, literature on independent and dependent variables of the study, theoretical reviews, empirical reviews, conceptual framework, the research gaps, and a summary of the past literature reviewed.

2.2 Theoretical literature Review
Project managers had a fundamental concern of performance and sustainability of Water projects. Researchers then searched for determinants of effective performance and sustainability of the water projects and three prominent theories emerged regarding the performance and sustainability of water projects.

2.2.1 The Agency Theory
This Theory suggests that the base organisation sets up a temporary organisation and assigns it to perform work on its behalf. This theory is directed at studying a relationship in which one party (the principal) delegates work to another (the agent), who performs the work. This Theory is primarily used in situations where two parties enter into a contract, but the reasoning of the theory is also relevant when no formal contract is signed Agency theory specifically addresses the following questions: Which is the best way for the principal to control the relationship between the principal and the agent to ensure the optimal solution for the principal? Which issues affect the relationship? Problems that arise when the two are not quite alike, or if they differ in some way. Agency theory points to areas where the two parties may differ.
They may at least be dissimilar in the following aspects: Preferences (Project Owner and the Project Manager may have conflicting values), Available Knowledge (Project Owner and the Project Manager do not have the same knowledge), and also Attitude to Risk (Project Owner and the Project Manager may have different risk aversions), i.e. they dislike differently exposure to risks.

(Turner and Müller, 2004) discuss communication and cooperation between the project owner and the project manager. The best project performance requires good communication and high collaboration between the two parties. Unfortunately, this is not how it happens in many projects. There is distrust, even conflict, between owner and manager, and the owner sets tight constraints within which the manager must work. Project owners’ mouths partnership and empowerment, but implements conflict and tight control. This study makes use of Principal Agency theory to explain why the sustainability factors came into being and argues that better communication between the project owner and the project manager may reduce the effect of Funding, Staff Management, Adoption of Modern Technology, and Social Cultural effect thus leading to the projects achieving performance and sustainability.

2.2.2 The Theory of Constraints

The theory of constraints (TOC) is an overall management philosophy introduced by Eliyahu M. Goldratt in his 1984 book titled The Goal, that is geared to help organizations to continually achieve their objective and goals. Goldratt Theory of constraints was first used by Goldratt. The theory says that every system, no matter how well it performs, has at least one constraint that limits its Performance this is the system's "weakest link." The theory also says that a system can have only one
constraint at a time, and that other areas of weakness are "non-constraints" until they become the weakest link. Project managers use this theory to identify project constraints in the modern world today and thus change the way the project team works to overcome it.

The researcher suggests that this Theory of constraints can be applied to evaluate projects performance and sustainability. According to this study the constraints include: Completion Time and Date of Project, cost of project, and Scope of project If project managers handle this barrier to performance of the projects while performing their project activities the performance of the projects is improved thus, leading to sustainability of the projects.

2.2.3 The Contingency Theory

Contingency is a leadership model which states that there is no one best way to manage, projects and that projects are more successful when the management style fits the nature of the work and tasks, and success relates to the fit a project has with its environment.

Contingency theory suggests organizational effectiveness depends on how well an organizational structure matches its environment. This theory proposes, “effective organizational performance depends on a complex relationship among environmental characteristics, i.e. production, technology, internal differentiation, and integration”. Hence it has become one of the most consistent theoretical perspectives used in Project Management Research, where project success is contingent upon a combination of organizational, project, and people-based factors (Herbert & Mathews, 1977)
The Contingency Theory suggests that different environments require different organizational relationships for optimum effectiveness, taking into consideration various social, legal, political, technical and economic factors. In addition, Contingency theory views conflict when project team members are undertaking their activities as inescapable but also manageable. Therefore, contingency theory explains that projects performance and sustainability is a function of a managers’ ability to adapt to environmental changes.

2.3 Empirical Review

Effect of the Independent Variables on Performance and Sustainability of the Rural Community Water Supply Projects

2.3.1 Financial effect on performance and sustainability of water supply projects

The financing process, i.e., raising and maintaining adequate funds for the Water Supply Schemes (WSS) facilities and activities, is clearly of critical importance to their performance and sustainability. Insufficient financing is a major factor in performance and sustainability of water supply schemes which, in turn, is often cited as a reason for Water Supply project failure. The commitment of resources, particularly financial resources, by beneficiary communities is seen as an important factor of the expected value of the project to these communities (Harvey, 2007). Financial questions are intimately bound to many other factors, including technological choice. Choices regarding water supply schemes are, to some degree, dependent on physical characteristics within the water supply project area, such as length of pipeline or depth of drilling needed to reach potable water sources. These choices, in turn, determine capital requirements and recurrent financing needs. Capital
costs of equipment, labor, and material costs associated with initial water project activities, including any and all construction activity.

Recurrent costs are those associated with operation, maintenance, repair, and replacement of system which have also to be considered to have an effect on the sustainability of water supply schemes. Also water supply project location, labor costs, and administrative costs also have an impact. Complete life cycle accounting methods should be used to ascertain the total costs involved. Beneficiary contribution by the community to capital costs, either labor or money, may be a significant indicator of water supply systems performance and sustainability. Contributions are likely to indicate a sincere desire for the benefits which accrue from water supply schemes. However, the willingness to contribute to capital expenditures, in cash or in-kind, does not of itself ensure sustainability. However, community management is only as good as the funds to support it, and the sustainability of the water project benefits depends ultimately on the ability of the community to provide these funds.

In developing sustainable financing resources there is determination of real costs of the water supply project (Fonseca and Njiru, 2003) It is needed to ensure that communities are aware of the financial commitment required to plan, implement, and execute the water supply system to allow them to select the most appropriate technology and system for them, and to determine the level of external financial support that may be required (Harvey, 2007).

Also the issue of cost sharing by the local community in the financing of the water supply schemes is crucial in the process whereby it enables the community to manage their systems after completion. However, it must be clear that it does not imply total
financial responsibility belongs to the community. It does mean that that some contribution from users is needed to establish commitment, which through time should increase to reach the intended level of making the developed water supply systems sustainable overtime (Evans, 1992, Sebsibe Alemneh, 2002).

However, the provision of a sustainable water supply scheme is neither cost free nor sustainable unless the costs are recovered. These costs comprise operation costs, repair and maintenance costs and replacement and/or rehabilitation costs (Briscoe and de Ferranti, 1988). The success of cost recovery efforts, as a key post-project determinant of sustainability, will be influenced by the extent to which individuals and committees are supported, re-trained, and guided in relation to the broader financial management. If such (external) guidance is absent, then it is likely that the success of cost recovery efforts will slowly diminish over time (Misgina, 2006).

2.3.2 Social Cultural effect on performance and sustainability of water supply projects

Socio-cultural factors include such diverse elements as ethnic and language differences, religious divisions, social stratification, intergroup relations, and the status of women. All these have a bearing on the shape and scope of a water supply schemes and cannot be ignored. Of particular note are cultural attitudes to the environment. Attitudes related to conservation and preservation of natural water resources which ensure availability of water to the water supply schemes vary among societies and different rural communities. In most cases WS&S projects will need to consider the environmental ethic of the population as a contextual factor and adapt to the conditions it imposes. It may be possible to influence these ethnic communities if it is included as a project objective and approached as a developmental process in
training and communication. However, such a major undertaking in social changes beyond the scope of most WS&S projects

According to, (Parry et al, 2001), (Harvey and Reed 2004), (WELL,2001), the social cultural aspect is tackled in terms of looking at the communities’ needs and priorities, technology choice, acceptance of the water supply project, gender diversity (women inclusive), village level power structures, and project ownership. Also capacity buildings programs, women involvements in the community implementation committee is also considered whereby the choice of their needs and priorities, appropriate technology will assist in the planning and implementation phases of developing sustainable water supply schemes and finally effective communication is also vital and fundamental to community water project sustainability. Communities then as a result make financial commitments, which give the community the opportunity to be aware of the project that is to be delivered in their communities. Community capacity building programs are normally routinely done to the staff to take new rising challenges. Because of these, the community makes their highest total commitment and financial contributions to the water projects performance and sustainability in the community.

2.3.3 Technological effect on performance and sustainability of water supply projects

Research conducted elsewhere shows that not appropriate technologies affects the performance and sustainability of water supply schemes but also states the need to involve the best and most effective water entities in the choice of the water supply system in terms of technology and financial affordability. In contrast, real impact of O&M programs, availability of local technicians, easy accessibility of spare parts
and replacements linked to the choice of technology has not been thoroughly assessed, though proper maintenance is believed to be a prerequisite-site on a sustained basis.

Apart from the issue of selecting an appropriate technology for a specific level of service it is also important to consider the overall technological context of the whole entire project. The technological context includes the types of technology envisioned for the water supply project, the general level of mechanical skills available within the population, availability of construction equipment and spare parts, and training opportunities relevant to the technologies used. Effective technology preferably considered as the installation of new equipment and short training program for users or maintenance personnel. Within a county, region, and community, there is a generalized knowledge and understanding of technical issues which form the context in which technical change is introduced. This context will have implications for specific technical issues related to operation, maintenance, repair, and training by the appointed staff. Some of these factors clearly overlap. The availability of the technological equipment and spare parts during cases of repair for the rural water supply schemes, for example, is influenced by the strength of the country’s economy.

In relation to this study the effect of modern technology to performance and sustainability of water supply schemes which in most developing African countries results to water supply project failures are associated with lack of standardized spare parts, hardware problems, technological transfer and unplanned maintenance procedures. The level of this problem regarding sustainability is a function of the
technological advancement of that country in the area of water supply projects (Parry et al, 2001).

2.3.4 Managerial Effect (skills) on performance and sustainability of water supply projects

Management stands out as a major skill area that determines whether a project succeeds or fails. In donor-assisted projects, the team leader is often an expatriate consultant, and his/her performance can make or mar the outcome. The team leader must be responsive to the contractor, donor, and host government, each with its own interests and agenda. Under conflicting pressures, the team leader and his local counterpart must be able to steer a course that leads the project towards the accomplishment of its objectives and somehow wins the cooperation of all. This achievement requires more than technical competence.

The responsibility for the success of a project rests squarely on the performance of the team leader/project manager/project chairperson and project team members. Edwards, emphasizes the need to win acceptance from the selected project team members which in turn influences the effectiveness of the team.

The successful implementation of projects is invariably related to a manager's ability to recognize and use informal procedures, relationships, agreements, and communication channels. Also the use of behind-the-scenes relationships and maneuvers to explain why things work or do not work. The ability to capture and guide informal dynamics characterizes outstanding managers (Honadle and VanSant,1985)
Project designs should not trap implementers in rigid-blueprints that eliminate opportunities to incorporate and evolve informal processes. Instead, a flexible and evolutionary approach is necessary. The ability to adapt to changing priorities is important. Things seldom turn out exactly as expected during the planning and design phases; the execution of a sustainable water supply project often calls for modifications.

2.3.5 Effect of Trained staff on performance and sustainability of water supply projects

One of the most conclusive findings is that training of the appointed staff has played an important role in ensuring the performance sustainability of water systems. This finding supports the notion that even when communities have high demand for water, they may lack the capacity to operate and maintain the system on their own. In addition to providing knowledge on how to operate and repair the water supply systems, training informs people of what expectations they should have for their water system and how to identify and address minor problems in the system before they become major. Providing people with information about the potential health benefits of an improved water supply affects how they value their water source and thereby improves their willingness to sustain the water supply systems.

To improve sustainability, the water supply project staff needs to ensure that the rules are well communicated and understood by those who are expected to implement them, especially with regard to community mobilization activities. In addition, staff needs to be appropriately trained and have adequate resources available to them. Projects should include training as part of their project design. Communities that receive training are more satisfied with their systems, more willing to pay the costs of
maintenance, keep their water supply system in better physical condition, and thus carry out better operations and maintenance services. At the same time, training members of the water committee will lead to better maintenance programs and financial management.

The most common method type of training is informal charlas (talks). This involves using didactic materials or actual hands-on experience, and very little formal classroom setting exercises which will be used as illiteracy rates are high. Training exercises will include a community map, seasonal calendar of the important dates and agricultural seasons, and a daily calendar of chores and activities to be done towards completion of the water supply schemes. These activities will be dual purpose; they are fact finding exercise for the staff to acquaint themselves with the area and culture, but also the dialog between the member of staff will open for the planning phase of the water supply schemes to begin. Later more specific project related issues will be tackled (work scheduling, land easements, by-laws, regulations, and tariffs.

2.4 Research Gap

This chapter has given the documented theoretical and literature reviews of the performance and sustainability of the water supply schemes from existing secondary sources according to the variables of the research. In the literature reviewed many studies have highlighted the effect of financial resources, managerial skills, modern technology, trained staff, and social-cultural factors on sustainability of the water supply schemes.

As discussed in previous section, relevant studies conducted elsewhere have already identified many interrelated components that somehow affect sustainability of water
supply schemes. Beyond this, nonetheless, no accurate research to determine how all aspects influencing long-term functionality of the water supply schemes has been carried out up to date, while it seems intuitively that all of them are equally relevant, there are significant issues with regard to their relative importance unsolved.

Are there benefits to be derived from appropriate sustainable water supply schemes? Are there enough financial resources to finance the operations of water supply schemes? Are their local available spare parts to be used in the repairs and replacement of water supply schemes? Does Integrated Water Resource Management (IWRM) produce desired impacts on local water supply schemes? Which technologies appear to be appropriate in rural areas? It is believed that tackling financing issues, promoting the private sector, ensuring appropriate O & M programs are different alternatives with their own cost implications. An accurate assessment of all these aspects is something that will be further addressed in the future research.

The chapter has stated community participation in decision making, community contribution, gender representation, responsibility, and other social factors has shown that their involvement in water projects activities has resulted in development of sustainable water supply schemes in the urban areas. Although in some developing countries especially in rural areas. Human capacity development is remains an issue. There is need for specialized training of staff, and education of professional water project managers, community members and the whole project team. The identified areas of research in Kenya, and other African countries, and in particular kipkelion east constituency are of community training and education, level of awareness of
available modern technology, types of training in terms of gender, relevance of training and number of trainees.

Lack of community education to the benefits of sustainable water supply schemes is one of the factors which could lead to breakdown of water supply projects. Water resources are classified according to water sources such as groundwater, surface water and rainwater. Limited water resources conservation could lead to non-sustainability of water supply schemes. It has been indicated and observed that while water resources conservation level is still low among rural communities, it greatly determines the reliability and sustainability of water projects. The literature reviewed shows there is knowledge gap of studies done locally to investigate the determinants of sustainability of community managed water projects in Kipkelion East constituency. This indicates that there is a local knowledge gap on water projects’ sustainability issues in Kenya. Therefore, this research is done in order to investigate the factors of sustainability of community water projects in Kipkelion east constituency.

2.5 Conceptual Framework

It is well noted that the success of lasting sustainable rural water supply schemes is placed upon factors affecting the performance and sustainability of water supply projects. These Factors include availability of Financial Resources, Managerial Skills, Modern Technology, Trained staff, and the Social Cultural factors, therefore the conceptual framework of the rural water supply schemes will include the independent variables which are internal and the external variables such as completion, time, cost and scope of the projects. The study will investigate the effect of the independent
factors on the dependent variables in order to determine the performance and sustainability of water supply projects in Kipkelion east constituency. In order to have a closer look at the interplay of these factors, the researcher presents below a conceptual framework of sustainable water services of Kipkelion east constituency.

**INDEPENDENT VARIABLES**

**Financial Resources**
- Government Funding (C.D.F)
- External donors/Aid

**Managerial Skills**
- Budgeting
- Project Team Management

**Training of Staff**
- New rules/regulations
- Skills on new technology
- Effective communication

**Modern Technology**
- Cost Effectiveness
- Quality Water Supply Projects

**DEPENDENT VARIABLES**

**Project Performance**
- Time
- Cost
CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction
This Chapter contains a detailed explanation on how the research study was carried out. It describes the research design, study population, the sample size and sampling procedure selected, research instruments and design, the validity and reliability of data collected.

3.2 Research Design
The study employed a descriptive survey research design. According to Lugo (2008), descriptive survey research design is a type of research used to obtain data that can help determine specific characteristics of a group. A descriptive survey involves asking questions (often in the form of a questionnaire) of a large group of individuals. The main advantage of survey research is that it has the potential to provide us with a lot of information obtained from quite a large sample of individuals.

The survey research is most appropriate since the researcher aimed to only gather information about the variables as they occur within the sample population without manipulating them. Through this design, the study focused on obtaining quantitative data from a cross-section of community members. It was also used to collect qualitative data from key informants

3.3 Target Population
Burns & Grove (2009) noted that the target population is the entire aggregation of respondents that meet the designated set of criteria. The targeted population of the
research study was water project officers from 10 existing water supply projects. The community water supply projects are located within the community and its operations are directed in improving the lives of the community in which they serve within Kipkelion east constituency.

### 3.4 Sampling Design

Polit & Hungler (2013) say that sampling involves a process of selecting a sub-section of a population that represents the entire population in order to obtain information regarding the phenomenon of interest. It’s a procedure by which a few subjects are chosen from the target population to be studied in such a way that the sample can be used to estimate the same characteristic in the total target population. The advantages of using samples rather than surveying the population are that it is a much less costly, quicker and if selected properly gives results with known accuracy that can be calculated mathematically. The sampling design used in this study specifies the number of sampling units that were selected for measurement. In this research study, water Supply projects built between 2003 and 2016 were considered. The researcher used 10 C.D.F funded community water projects from a population of 384 C.D.F funded projects in the whole of Kipkelion constituency which were identified from records in Londiani constituency office data records. The reason for sampling only the 10 existing water supply projects was that the ones that were on record were never implemented between the period 0f 2007 to 2012. Some water project managers and the designated water project committee members were given questionnaires to fill with the assistance of Research Assistants on sustainability issues of the water supply facilities.
3.6 Study Population

The Researcher in this study adopted simple random sampling which was used to select 10 C.D.F funded Kipkelion East water supply projects. The researcher then identified water supply project managers and water project committee members who were involved in the implementation of the constituency water supply projects.

<table>
<thead>
<tr>
<th>Water Project</th>
<th>No of Project Managers</th>
<th>Other Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bargechech Water Project</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Ngatumek Water Project</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Kimugul Water Project</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Kedowa Water Project</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Cheptangulgei Water Project</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Chepkutpei Water Project</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Tumaek Water Project</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Kiptangit Water Project</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Nyakinyua Water Project</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Rusoi Water Project</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>10</strong></td>
<td><strong>45</strong></td>
</tr>
</tbody>
</table>

Source: Research Data (2016)

3.7 Data Collection Instruments and Procedure

Different data collection instruments and methods collection were used by the researcher in this research study. The study used questionnaires to collect data from project Managers/Chairperson, appointed Water Project Committee Members. Moreover, Secondary Data of the existing water supply projects within the constituency was collected through past existing documented Water Project Reports, and CDF office records, and others sources from Kipkelion East (Londiani) C.D.F offices. The priority task of the data collection involved gathering of general and
specific information pertaining to the socio-economic, demographic and physical characteristics, of the existing water supply schemes under study.

3.8 Validity

Validity is described as the degree to which a research study measures what it intends to measure. Validity can also be defined as the ability of a data collection instrument to measure what it is supposed to measure (Mugenda & Mugenda, 2003). Content validity yields a logical judgment as to whether the instrument covers what it is supposed to cover. Content validity ensures that all respondents understand the items on the questionnaire similarly to avoid misunderstanding. To ensure content validity, the questionnaires were reviewed by the research supervisor. This process assisted in illuminating any potential problems of the research instrument and provided a basis for redesign or any structural changes.

3.6 Reliability

Polit and Hungler (2013) state that reliability refers to the degree of consistency or accuracy with which an instrument measures the attribute it has been designed to measure giving an accurate representation of the total population under study. And if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable. To ensure reliability, the researcher used split-half technique to calculate reliability coefficient (Spearman-Brown coefficient) which was found to be 0.8 which is within the recommended reliability coefficient of 0.7-1 (Mugenda & Mugenda 2003). This involved scoring two-halves of the tests separately for each person and then calculating a correlation coefficient for the two sets of scores. The instruments were split into the odd items and the even
items. Statistical Package for Social Sciences (SPSS) was used to calculate the reliability of the instrument (equal length Spearman-Brown coefficient).

3.9 Data Analysis and Representation

Data analysis is the process of developing answers to questions through the examination and interpretation of data collected. According to De Vos, (1998) Data analysis in this research study took both qualitative approach and quantitative approach to analyze the structured questions in the questionnaires and the data collected from the C.D.F office records. The hired research assistants (R.A) collected the questionnaire’s that were filled by the constituency water project managers and administrators. The returned questionnaires were then checked for consistency, cleaned and then coded and analyzed using the Statistical Packages for Social Scientist (SPSS) computer software as a tool.

Qualitative approach was used for the unstructured question which was then summarized to capture common themes and present them in form of Frequency, and distribution tables. The researcher used descriptive statistics to simplify large amounts of data that was obtained which included frequency distribution tables and statement count score tables.
CHAPTER FOUR
DATA ANALYSIS, PRESENTATION AND FINDINGS

4.1 Introduction

This Chapter focused upon the analysis of the questionnaire data. Results of the Analysis are presented using descriptive tables of frequencies and percentages. Further analysis has been done for the specific research questions and their responses on Statement Count Score Tables to summarize the data collected.

4.2 Sample characteristics

4.2.1 Response Rate

A Total of 55 questionnaires were produced and administered to the respondents. At the end of the data collection process the 50 questionnaires were returned and hence were coded and analyzed representing 90% response rate. The questionnaire response rate of 50% and above is sufficient for analysis (Mugenda & Mugenda, 2003).

4.3 Background Information of the Respondents

This section discusses the demographic characteristics of the sampled respondents which included; gender, level of education and staff position

4.3.1 Gender Distribution of Respondents

The respondents were asked to tick their gender from the choices provided. The respondents’ gender was analysed in order to establish the representative of respondents in terms of gender in Kipkelion East.
Table 4.1 Gender of Respondent

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>34</td>
<td>68%</td>
</tr>
<tr>
<td>Female</td>
<td>16</td>
<td>32%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Research Data (2016)

Findings

From the Findings presented in the table 4.1 above the Males are the Majority representing 68% of the respondents and the females were 32% this reveals that the number of female respondents who participated in the study were fewer than their male counterparts. This shows that there is gender imbalance in the composition of the water management projects committees especially at the executive level.

4.3.2 Respondents level of Education.

The researcher also analyzed the level of education of the respondents so as to determine whether the performance of the projects had a correlation with knowledge and skills of the respondent’s thus achieving objective of the performance and sustainability of the Kipkelion East community water supply projects.

Table 4.2 Respondents level of education

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>5</td>
<td>10%</td>
</tr>
<tr>
<td>Secondary</td>
<td>9</td>
<td>18%</td>
</tr>
<tr>
<td>College</td>
<td>23</td>
<td>46%</td>
</tr>
<tr>
<td>University</td>
<td>13</td>
<td>26%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Research Data (2016)
Results from the table 4.3 above show that majority of the water committee members have a college qualification represented by 46%, 26% of the respondents have a degree, 18% have attained (K.C.S.E) certificate, and with the least educational level being primary level education who are 10% of the respondents. This means that a majority of the respondents were able to answer the questions posed to them and understood the determinant of performance and sustainable of the water projects.

### 4.3.3 Staff Position

Results of the Analysis of the findings of staff position data are presented by the descriptive tables of frequencies and percentages as shown in the Table 4.3

<table>
<thead>
<tr>
<th>Staff position</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager/Chairperson</td>
<td>10</td>
<td>20%</td>
</tr>
<tr>
<td>Vice Chairperson</td>
<td>8</td>
<td>16%</td>
</tr>
<tr>
<td>Treasurer</td>
<td>11</td>
<td>22%</td>
</tr>
<tr>
<td>Secretary</td>
<td>9</td>
<td>18%</td>
</tr>
<tr>
<td>Community Member</td>
<td>12</td>
<td>24%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: Research data (2016)

The result in table 4.3 shows that the community members are the majority with 24% followed by the Treasurer 22%, and then the Chairpersons/Project Managers 20%, Secretaries 18% and the least are the Vice Chairperson 16% of the respondents. This is an indication that the representation of a Community Member in the Water Management Committee was of great importance in making decisions with regards to Water Project Initiation, Planning, Execution, and Choosing of an appropriate site location of the Water facility preferably nearby a reliable Water Reservoir.
4.3.4 Project Operation Duration

Results of the analysis of project operation duration are presented using the table of frequencies and percentages as shown in the Table 4.4

<table>
<thead>
<tr>
<th>Duration Of Operation of Water Project</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months to 1 year</td>
<td>14</td>
<td>28%</td>
</tr>
<tr>
<td>1 year to 2 years</td>
<td>8</td>
<td>16%</td>
</tr>
<tr>
<td>2 years to 3 years</td>
<td>4</td>
<td>8%</td>
</tr>
<tr>
<td>Above 3 years</td>
<td>24</td>
<td>48%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: Research data (2016)

Results from the frequency distribution table above show that 48% of the water projects were in operation (Above 3 years), 28% (6 months to 1 year) in operation, 16% (1 year to 2 years) in operation, and the least percentage represented by 8% (2 years to 3 years).

4.4 Project Performance

An analysis was done on the effect of performance of the water community Projects and responses made to statements made to whether the projects were completed within the budgeted cost, and within the given Time limit, Completion of projects within the budgeted cost shows a high level of efficiency and effectiveness of the selected water management committee members. Completion of projects within the budgeted cost is an indication of accountability of the C.D.F funds and finances from the Donors. The results are shown in the Statement Count Score Table 4.5
The findings from table 4.5 revealed that majority (92%) of respondent agreed water project were completed within the given time limit, followed by (90%) who agreed to the statement that there was continuous water supply to water projects from the water resources. (88%) of the respondents agreed to the statement that the water project is built to meet quality standards. The same (88%) was evident with locally available spare parts during breakdown of the project. (86%) of the respondents. This meant that the water projects were completed in time and were running thus the community was benefiting from the services of the water projects (water for washing, farming, and livestock). These findings coincide (Bumgardner et al, 1971) who stated that success of a project rests squarely on the performance of the entire project operations.

4.4.1 Trained Staff

The study sought to determine the effect of trained staff members in management with relation to performance and sustainability of the water projects. The respondents were then asked to indicate the extent of their agreement with each of the statement.
by ticking as appropriate along five-point scale, in which responses were coded for analysis using SPSS version 21: Strongly agree = 1[ ], Agree = 2[ ], Uncertain = 3[ ], Disagree = 4[ ], Strongly disagree = 5[ ]. Their responses were summarized and presented in the table 4.6.

Table 4.6: Statement Score Table of the Effect of Trained Staff

<table>
<thead>
<tr>
<th>Statement</th>
<th>Response (%)</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of Training Resources Staff members</td>
<td>10 60 4 18 8</td>
<td>3.14</td>
<td>0.311</td>
</tr>
<tr>
<td>Availability of skilled staff in maintenance services</td>
<td>40 48 6 4 2</td>
<td>3.73</td>
<td>0.302</td>
</tr>
<tr>
<td>Dialogue of Staff with community members</td>
<td>70 20 2 4 4</td>
<td>3.88</td>
<td>0.351</td>
</tr>
<tr>
<td>Community mobilization activities (Payment of maintenance fee)</td>
<td>60 30 6 2 2</td>
<td>3.85</td>
<td>0.331</td>
</tr>
<tr>
<td>Availability of knowledge for the trained staff to run water project</td>
<td>30 60 2 6 2</td>
<td>3.47</td>
<td>0.336</td>
</tr>
<tr>
<td>Clear Communication of code of Ethics</td>
<td>50 40 4 2 4</td>
<td>3.63</td>
<td>0.324</td>
</tr>
</tbody>
</table>

Source: Research Data (2016)

The table 4.6 above shows that the largest percentage (90%) of the respondents agreed with statement that there is dialogue between the community members and staffs. (90%) of the respondents strongly agreed to the statement of community mobilization activities through payment of maintenance fee. It was also noted that (90%) of the respondents agreed to the statement that there is a clear communication of code of ethics between the water management committee members. (70%) agreed with the statement that there is availability of training resources for the staff members to enhance the performance and sustainability of the water projects. The findings indicated that dialogue between community and water management committee members, availability of training resources, and community mobilization activities
was vital in enhancing project performance and sustainability. The findings coincide with (UNDP World Bank Water and Sanitation Program Report, 1998) who stated that to improve sustainability, the water supply project staff needs to ensure that the rules are well communicated and understood by those who are expected to implement them, especially with regard to community mobilization activities. In addition, staff needs to be appropriately trained and have adequate resources available to them. Projects should include staff training as part of their project design. Communities that receive training are more satisfied with their systems, more willing to pay the costs of maintenance, keep their water supply system in better physical condition, and thus carry out better operations and maintenance services. At the same time, training members of the water management committee will lead to better maintenance programs for achievement of the overall objective of obtaining sustainable water projects.

4.4.2 Technological effect

In determining technological effects on performance and sustainability to the water projects, the respondents were asked to indicate the extent of their agreement with each of the statement by ticking as appropriate along five-point scale, in which responses were coded for analysis using SPSS version 21: Strongly agree = 1[ ], Agree = 2[ ], Uncertain= 3[ ], Disagree = 4[ ], Strongly disagree = 5[ ]. Their responses were summarized and presented in the table 4.7.
The table 4.7 revealed that majority (90%) disagreed with the use of computerized communication and record management by the staff. This implied that the staff had not embraced the use of I.C.T technology in digitizing the records and files containing information of operations of the water projects. (90%) of the respondents agreed to availability of modern technological equipment during cases of repair of the water projects. Followed by (88%) of the respondents agreed to the statement of procurement of standardized technological equipment for the new water projects provided from the county. It is significant to consider the overall technological aspect in entire project as improving the performance and development of the water projects. The findings agreed with (Parry et al, 2001) findings which noted that Apart from the issue of selecting an appropriate technology for a specific level of service it is also important to consider the overall technological context of the whole entire project The technological context includes the types of technology envisioned for the water supply project, the general level of mechanical skills available within the population,
availability of construction, and training opportunities relevant to the technologies used.

4.4.3 Managerial Effect

In determination of managerial effects on performance and sustainability to the water projects, the respondents were asked to indicate the extent of their agreement with each of the statement by ticking as appropriate along five-point scale, in which responses were coded for analysis using SPSS version 21: Strongly agree = 1[ ], Agree = 2[ ], Uncertain = 3[ ], Disagree = 4[ ], Strongly disagree = 5[ ]. Their responses were summarized and presented in the table 4.8.

Table 4.8: Statement Count Scores of Managerial Effect

<table>
<thead>
<tr>
<th>Statement</th>
<th>Response (%)</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation of a code of ethics</td>
<td>44 48 2 4 2</td>
<td>2.64</td>
<td>0.252</td>
</tr>
<tr>
<td>Authenticity of water project records by the Project Manager</td>
<td>66 20 4 4 6</td>
<td>3.16</td>
<td>0.286</td>
</tr>
<tr>
<td>Project Manager has Skilled staff in operations of the water facility</td>
<td>64 16 8 6 6</td>
<td>3.05</td>
<td>0.262</td>
</tr>
<tr>
<td>Community Representative in the Water Project Committee</td>
<td>64 16 8 6 6</td>
<td>3.15</td>
<td>0.362</td>
</tr>
<tr>
<td>Design of an Organizational structure</td>
<td>60 32 4 2 2</td>
<td>3.11</td>
<td>0.314</td>
</tr>
</tbody>
</table>

Source: Research Data (2016)

The Table above 4.8 indicates that (92%) a majority of the respondents were in agreement with the statement of implementation of a code of ethics for water management committee members (staff) had been put in place and also Design of an organization structure was also present. (86%) of the respondents agreed to the statement that there was authenticity of the water project records by the project manager to the committee members. (80%) of the respondents agreed that there was a Community Representative in the water management committee. This meant that the
representation of a community member in the water management committee was very important where by his/her contribution in operations pertaining to the performance of the water projects was found to have great impact. The findings from this study are supported by (Honadle and Vansant, 1985) who concluded that the performance of a projects is invariably related to a manager's ability to recognize and use informal procedures, relationships, agreements, and communication channels. Also the use of behind-the-scenes relationships and maneuvers to explain why things work or do not work. The ability to capture and guide informal dynamics characterizes outstanding managers.

4.4 Financial Effect

The study sought to determine the effect of financial availability on performance and sustainability to the water projects. The respondents were asked to indicate the of their agreement with each of the statement by ticking as appropriate along five-point scale, in which responses were coded for analysis using SPSS version 21: Strongly agree = 1[ ], Agree = 2[ ], Uncertain= 3[ ], Disagree = 4[ ], Strongly disagree = 5[ ]. Their responses were summarized and presented in the table 4.9.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Response (%)</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donor Support for the Water Project</td>
<td>60</td>
<td>26</td>
<td>4</td>
</tr>
<tr>
<td>Community contribution in raising funds for the water project</td>
<td>16</td>
<td>64</td>
<td>4</td>
</tr>
<tr>
<td>Adequate funds for maintenance services</td>
<td>18</td>
<td>50</td>
<td>6</td>
</tr>
<tr>
<td>C.D.F funding is Meets budgeted cost</td>
<td>64</td>
<td>24</td>
<td>4</td>
</tr>
<tr>
<td>Water project capital costs is overestimated</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Research Data (2016)
The findings from Table 4.9 above shows that most respondents (88%) agreed that the C.D.F funds provided met the budgeted cost. (86%) of the respondents agreed that they got donor support for the implantation of the water projects. In addition, 80% of the respondents agreed that there were community contributions in raising funds for some of the water projects. (88%) strongly disagreed that the budgeted capital cost for the initiation of the water projects was overestimated. This meant there were enough funds provided for the implementation and construction of the water projects. Thus the availability of adequate finances influences the sustainability of the water projects. The findings from this study coincided with (Evans, 1992, Sebsibe Alemneh, 2002). who noted that cost sharing by the local community in financing of the water supply schemes is crucial in the process whereby it enables the community to manage their systems after completion. And thus leading to achieving sustainable water supply projects overtime.

4.4.5 Social Cultural Effect
In determination of Social-Cultural effects on Performance and Sustainability of the Water Projects, the respondents were asked to indicate the extent to which their agreement with each of the statement by ticking as appropriate along five-point scale, in which responses were coded for analysis using SPSS version 21: No Extent = 1[ ], little Extent= 2[ ], = Average Extent3[ ], Great extent = 4[ ], Very Great Extent = 5[ ]. Their responses were summarized and presented in the table 4.10.
Table 4.10: Statement Count Scores of Social Cultural Effect

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Youth group engagement In operations of the Water Project</td>
<td>4</td>
<td>8</td>
<td>28</td>
<td>28</td>
<td>32</td>
<td>2.95</td>
<td>0.223</td>
</tr>
<tr>
<td>Impact of Women in the Water Management Committee</td>
<td>4</td>
<td>12</td>
<td>28</td>
<td>32</td>
<td>24</td>
<td>2.47</td>
<td>0.241</td>
</tr>
<tr>
<td>Religious Affiliation in Water Project Operations</td>
<td>16</td>
<td>26</td>
<td>42</td>
<td>8</td>
<td>8</td>
<td>2.16</td>
<td>0.219</td>
</tr>
<tr>
<td>Community Capacity Building programs For Challenges facing the Water Projects</td>
<td>4</td>
<td>28</td>
<td>60</td>
<td>4</td>
<td>4</td>
<td>2.73</td>
<td>0.270</td>
</tr>
<tr>
<td>Village level Project Ownership</td>
<td>4</td>
<td>8</td>
<td>4</td>
<td>36</td>
<td>48</td>
<td>2.24</td>
<td>0.234</td>
</tr>
</tbody>
</table>

N = 50

Source: Research Data (2016)

The findings from table 4.10 revealed that majority (84%) of the respondents noted that village ownership of the water project by community members was of great extent, followed by (60%) of the respondents who said that the engagement of youth groups in operations of the water project was of great or very great extent. Also (60%) of the respondents said that community capacity building programs to address challenges facing the water projects were being implemented having average extent. This meant that there only few water projects that were facing internal management challenges thus this capacity building programs were implemented to ensure efficient performance of the water projects. (42%) of the respondents said that participation of a particular religious’ affiliation in the water project operations was of average extent. (32%) of the respondents said that the impact of women in the water management committee was of great extent. These indicated that social-cultural factors are of great influence on project performance and sustainability.

The findings are supported by (Harvey and Reed 2004), (Cleaver, 1991), (WELL, 2001), who noted that social cultural aspect is tackled when looking at it as a
factor affecting the performance and sustainability of water projects the needs and priorities, technology choice, acceptance of the water supply project, and village level project ownership. Also capacity buildings programs, which are normally routinely done to the staff to take new rising challenges facing the water projects, and finally gender diversity (women inclusive), their involvements in the community implementation committee is also considered whereby the choice of their needs and priorities, appropriate technology will assist in the of which is vital and fundamental to community water project performance and sustainability.
CHAPTER FIVE
SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction
This Chapter presents the Summary Conclusion and Recommendations arising from this Research study which involved a sample of 50 respondents form a target population of 10 water supply projects

5.2 Summary of the Study
The main objective of this research study was to examine the influence of financial resources, Managerial Skills, Social Cultural factors, Training of the selected staff members, and adoption of the modern technology on the performance and sustainability of Water Supply Projects in Kipkelion East Constituency.

The research study addressed the following specific objectives during the study :The effect of financial resources on the water supply projects, the effect of Managerial skills on the water supply schemes, the effect of Social cultural factors on performance and sustainability the water supply schemes, the effect of Trained staff members in management with relation to performance and sustainability the water supply schemes, and the effect of Modern technology on performance and sustainability of the water supply projects.

From the 50 returned and filled questionnaires which were analyzed more Males participated in the research study than Females. The Respondents level of education was also analyzed with the majority of the Water Management Committee members having college education level qualification. The study found out that a good number
of the water management committee members were familiar with the sustainability condition of the water supply projects and hence able to give reliable information.

The extent to which financial resources influence the sustainability of the projects in Kipkelion East Constituency was observed to be of great impact by majority of the respondents. In addition, with support from donors who were able to donate funds to finance the water projects, the water project committee members had to show authenticity in the Project records. The study therefore noted that financial resources were considered to be of great importance as a determinant of the Water Project sustainability. The study noted that a majority of the projects were able to kick of due to the availability of Funds from C.D.F hence a majority of the Projects were able to be completed within the given time limit.

The impact of the Technology used for the construction of water supply projects allows for existence of Project sustainability. The technology used was standardized and appropriate selected on the basis of its performance, technical, available finances, and social cultural acceptability by the Water Management Committee. In this Research study it was noted that the Water Management Committee have not yet embraced the use I/C.T equipment e.g. Computerized Systems in their administrative duties as shown in the Statement Count Score Table of Technological Effect where the keeping of records that is still being used is the filling system. There is no digitization of water supply projects records, thus the documents are prone to getting lost or being misplaced.
The design of an Organizational structure greatly influences the projects performance and sustainability. In this research study the Framework included rules, responsibilities and a code of ethics for the water project committee members. The researcher also found that the design of the organizational structure in the study took the form of selected water management committee members which constituted of; Project Manager/ Chairperson., Vice Chairperson, Treasurer, Secretary, and for each Committee there had to be one to three community representatives. The creation of this Water Management Committees has provided a well-organized form of local community organization, which brought new initiatives to the water projects. Findings have shown that these committees have ensured the sustainability of the water projects through effective management. This design of the organization structure was considered to be a way of exercising authority for efficient running of water project operations and responsibilities.

Finally, the social cultural effect also had influence on the project performance and sustainability whereby their involvement of each gender has had great impact towards the sustainability of the water projects. In particular Women’s contribution in the water management committee has had great impact giving them opportunity to share their views, thoughts or ideas towards the sustainability of the water projects. This has improved their dignity and increased their status in the wider community thus strengthening the role of women in the Kipkelion East Community. The reduced distance to the water supply projects improved their security, and safety.
5.3 Conclusion

The Study concluded that the performance of a majority of the water projects was quite excellent. The researcher concluded that the staffs were familiar with matters pertaining to performance and sustainability of the water supply projects within Kipkelion East Constituency. This involved the Financial, Managerial, Technological, and Social Cultural aspects.

The Researcher also concluded that the effect of financial resources on sustainability of the water projects was of great extent. There was availability of enough adequate finances to fund the water projects from the C.D.F for the installation of the Community water projects. After the Study with it was found out that the effect of Financial Resources was a determining Factor influencing the performance and Sustainability of water supply projects.

The Study concluded that the form of design of organization structure had influence on the performance and sustainability of the water Projects. This was clearly shown during the study where the organizational structure used by the project managers consisted of five members of staff who worked effectively towards ensuring the sustainability of the water projects.

The Researcher concluded that I.C.T adoption by the Water Management Committee appointed individuals was not clear at all. Most of the administrative offices had no computerized systems to keep Water project records. They still used the filing system.
The Researcher also concluded that the availability of locally skilled trained staff had influence on the water projects performance and sustainability. Their services and development increased their employee empowerment thus increasing their efficiency in project operations and maintenance services.

It was concluded that the representation of a community member in the water management committee has influence on the performance and sustainability of water projects. Hence, this empowers him/her towards participation in the decisions pertaining to the installation of the water projects. Thus it was found his/her representation is a factor contributing towards performance and sustainability of the water projects.

The Researcher finally concluded that women representation in the water management committee enhanced the performance and sustainability of the water projects. This is due to the fact that women are the first ones to be concerned about availability of water. The study findings there by concluded that in order for the water projects to achieve the objective of performance and sustainability there has to be active involvement of the women gender whose influence was taken positively by a majority of the water projects staff for the sustainability of the water projects.

5.3 Recommendations

The Researcher recommended that the water project staff should seek more donor support for the purpose of financing operations of the water projects.
The Research study recommended that the water project committee members should embrace use I.C.T where Water Project Records ought to be digitized to prevent loss of vital information or data pertaining to the water project operations.

The Researcher recommends frequent capacity building programs for the Water Management Committee appointed individuals to become confident, self-motivated and self-reliant in management of the water projects.

The Researcher also recommends that frequent inspections ought to be done on water projects performances by the Project facilitators to address challenges facing the community on matters pertaining to the performance and sustainability.

There is need for the staff to implement strict policy of paying for the water services in order to cater for the maintenance of the water projects. The research study recommends that involvement of women in making decisions to improve the performance of the water projects should be a priority since they are the majority who use water for their daily activities.

5.4 Suggestions for Further Research

This work may serve as the basis for further studies in Project Performance and Sustainability. The researcher can adopt the same study in a different sector or set up. The study was also limited to four dependent variables Completion, Time Limit, Cost, and Scope. The suggested issues to this research study was sensitization of the in changes in the water sector reforms to the rural community and the policy and legal framework as stipulated by the Ministry of water which were due to the recent drought experienced in the country. Further research on areas requiring post
implementation support is also recommended as many rural water facilities begin to experience challenges after the third year of implementation.
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APPENDICES

APPENDIX I: INTRODUCTORY LETTER

KIRUI EMMANUEL RUTTO,

KENYATTA UNIVERSITY,

P.O. Box 43844-00100,

NAIROBI,

Kenya.

March 1\textsuperscript{st}, 2016.

Dear Sir/ Madam,

RE: QUESTIONNAIRE

I am a Postgraduate student at the School of Business in Kenyatta University pursuing a Masters Degree of Business Administration in Project Management. Having completed my coursework, I am conducting a research in “PROJECT CONSTRAINTS ON PERFORMANCE AND SUSTAINABILITY OF WATER PROJECTS IN KIPKELION EAST CONSTITUENCY.”

I am therefore requesting your participation in answering the simple questions provided in the study questionnaire with honesty, accuracy and to the best of your ability so as to help the study meet its objectives. The responses from this study will culminate into a research report which will be submitted to The University in partial fulfillment of the academic requirements for this course.

I assure you of absolute confidentiality about any information which may compromise on your identity. Thanks for participating and God Bless You,

Yours sincerely,

Kirui Emmanuel Rutto
APPENDIX II: QUESTIONNAIRE

SECTION A: GENERAL INFORMATION

Gender : (Male/Female)______________

Project: ________________

Location: ________________

Highest level of Education:

Primary: ________________

Secondary: ________________

College: ________________

University: ________________

1. What is your main responsibility in this Water Project?
   _________________________

2. What brought about the initiation of this Water project? (Tick one appropriate answer only)

☐ Water Source protection and Conservation.

☐ Seasonal Droughts.

☐ Supply of Water to surrounding agricultural activities.

☐ Increased construction of Surrounding Public utilities

☐ Accessibility to a nearby Water Facility.

3. For how many years has this Water Project facility been in operation?

☐ Six months to 1 year

☐ One year to Two years
SECTION B: PERFORMANCE

1. Kindly indicate (√) your opinion on the following statements as applies to the water project Facility (Water Project), where 1=Strongly Agree, 2=Not Sure, 3=Agree, 4=Disagree 5=Strongly Disagree

<table>
<thead>
<tr>
<th>To what extent do you agree with the following statements:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water project are completed within the budgeted cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water project completed within the given time limit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water project facility has been having continuous water supply after its completion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water facility has been built to the desired quality standards</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water facility has locally available spare parts in cases of breakdown</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There is representation of a community member in the water management committee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION C: FINANCIAL EFFECT

1. Kindly indicate (√) your opinion on the following statements as applies to the water project Facility, where 1=Strongly Agree, 2=Not Sure, 3=Agree, 4=Disagree 5=Strongly Disagree

<table>
<thead>
<tr>
<th>To what extent do you agree with the following statements:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.D.F funds provided for the Water Supply Facility meet the budgeted cost.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The water facility has been having funding support from donors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The surrounding community is involved in raising funds for the water facility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
There is adequate funds in financing the maintenance services of the water supply facility

The capital costs of the water facility been overestimated

SECTION D: MANAGERIAL EFFECT

1. Kindly indicate (√) your opinion on the following statements as applies to the water project Facility, where 1=Strongly Agree, 2=Not Sure, 3=Agree, 4=Disagree 5=Strongly Disagree

<table>
<thead>
<tr>
<th>To what extent do you agree with the following statements:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project manager has included a representative by the community in the Water project management committee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project manager has an organizational structure in the selected management committee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water project manager has authentic water project facility records</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project manager has members who are skilled in running services of the water supply facility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water project manager has a code of ethics in running operations of the water project facility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION E: TECHNOLOGICAL EFFECT

1. Kindly indicate (√) your opinion on the following statements as applies to the water project Facility, where 1=Strongly Agree, 2=Not Sure, 3=Agree, 4=Disagree 5=Strongly Disagree

<table>
<thead>
<tr>
<th>To what extent would you agree with the following statements as related to the technological effect to the water supply facility:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procurement of standardized technology in construction of new water facility is in place</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Installation of computerized Accounting system is being used by the Water management committee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The record management and communication operations are well computerized in running the</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

59
Use of standardized spare parts in repairs of the water supply facility is in place

Use of available technological equipment during cases of repair for the rural water supply facility is in place

SECTION F: TRAINED STAFF

1. Kindly indicate (✓) your opinion on the following statements as applies to the water project Facility, where 1= Strongly Agree, 2=Not Sure, 3=Agree, 4=Disagree

5=Strongly Disagree

<table>
<thead>
<tr>
<th>To what extent would you agree or disagree that the training of staff has affected the sustainability of the water supply Facility:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dialogue between the trained staff and the community members in deciding the appropriate location of the Water facility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Availability of knowledge For the trained staff on how to operate and maintain the Water Facility on their own</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The staffs are skilled in addressing maintenance services of the water supply facility.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The code of ethics and rules are well communicated to the water is management committee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There is enough training resources for the training of new members of staff of the water facility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There is community mobilization activities in running operations of the water facility e.g. pay the costs of maintenance services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SECTION G: SOCIAL CULTURAL EFFECT.

1. Kindly indicate (✓) your opinion on the following statements as applies to the water project Facility, where 1= No Extent, 2=little Extent, 3=Average Extent, 4=Great extent 5=Very Great Extent

<table>
<thead>
<tr>
<th>To what extent have the social cultural factors affected the sustainability of the water facility:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of Community capacity building programs to address challenge water projects performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of community commitment in financial contributions of water projects performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation of the religious affiliations in installation of the water facility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of women in making decisions during the planning phase of the water project facility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engagement of the different variety youth groups in the water O&amp;M programs of the water facility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of Village level project ownership initiatives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX III: LETTER OF APPROVAL

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

Internal Memo

FROM: Dean, Graduate School

TO: Kirui Emmanuel Rutto
    C/o Management Science Department.

DATE: 6th May 2016
REF: D93/CTY/PT/26255/13

SUBJECT: APPROVAL OF RESEARCH PROJECT PROPOSAL

This is to inform you that Graduate School Board, at its meeting of 27th April 2016, approved your Research Project Proposal for the M.B.A. Degree Entitled, “Project Constraints on Performance and Sustainability of Community Water Supply Projects in Kipkelion East Constituency Kenya”.

You may now proceed with data collection, subject to clearance with the Director General, National Commission for Science, Technology and Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking forms per semester. The form has been developed to replace the progress report forms. The supervision Tracking Forms are available at the University's website under Graduate School webpage downloads.

Thank you.

HARRIET BARKOKE
FOR: DEAN, GRADUATE SCHOOL

Chairman, Department of Management Science

Supervisors:

1. Dr. Paul K. Sang
    C/o Department of Management Science
    Kenyatta University
APPENDIX IV: AUTHORIZATION LETTER FROM THE INSTITUTION

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: D55/CTY/PT/26255/2013

DATE: 6th May 2016

Director General,
National Commission for Science, Technology
& Innovation
P.O. Box 36023-00100,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR KIRUI EMMANUEL RUTTO-- REG. NO.
D55/CTY/PT/26255/2013

I write to introduce Mr. Kirui Emmanuel Rutto who is a Postgraduate Student of
this University. He is registered for M.B.A degree programme in the Department
of Management Science.

Mr. Kirui intends to conduct research for an M.B.A Proposal entitled, “Project
Constraints on Performance and Sustainability of Community Water Supply
Projects in Kipkelion East Constituency Kenya”.

Any assistance given will be highly appreciated.

Yours faithfully,

MRS. LUCY N. MBAABU
FOR: DEAN, GRADUATE SCHOOL
APPENDIX V: NACOSTIRESEARCH AUTHORIZATION LETTER

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

6th Floor, Uhuru House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

when replying please quote

Ref. No: NACOSTI/P/16/15757/11396

Date: 24th May, 2016

Kirui Emmanuel Rutto
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on “Project constraints on performance and sustainability of community water supply projects in Kipkelion East Constituency Kenya,” I am pleased to inform you that you have been authorized to undertake research in Kericho County for the period ending 23rd May, 2017.

You are advised to report to the County Commissioner and the County Director of Education, Kericho County before embarking on the research project.

On completion of the research, you are expected to submit two hard copies and one soft copy in pdf of the research report/thesis to our office.

BONIFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:
The County Commissioner
Kericho County.
The County Director of Education
Kericho County.