FACTORS INFLUENCING SUSTAINABILITY OF WATER AND SANITATION PROJECTS: A CASE OF RHONDA SLUM PROJECTS IN NAKURU COUNTY, KENYA.

BY

OTIENO DAVID ALELAH

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DECLARATION

I declare that this research project report is my original work and has not been presented for a degree or any award in any other university.

Signature.....Date.....15/7/2017.....

OTIENO DAVID ALELAH

REG. NO. L50/79820/2015

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

Signature.....Date.....17/7/2017

MR. MUMO MUEKE

LECTURER, DEPARTMENT OF EXTRA MURAL STUDIES,

UNIVERSITY OF NAIROBI

DEDICATION

This research project is dedicated to my wife Emma Daisy and the entire family for their faith and unfaltering understanding, inspiration and moral support they gave throughout the course period. I further dedicate this to my cousin Clarence Ouma and uncle Bethwel Owuor who have constantly given me hope in life through their constant encouragement in my endeavors.

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LIST OF ABBREVIATIONS AND ACRONYMS

COHRE	Centre on Housing Rights and Evictions (Switzerland)
GoK	Government of Kenya
MDG	Millennium Development Goals
MoH	Ministry of Health
NAWASSCO	Nakuru Water and Sanitation Services Company
NGOs	Non Governmental Organizations
O&M	Operation and Maintenance
OECD	Organization for Economic Co-operation and Development
SPSS	Statistical Package for Social Science
UN	United Nations
UNICEF	United Nations Children's Fund
UNDP	United Nations Development Program
USAID	United States Agency for International Development
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization

ABSTRACT

Adequate access to water and sanitation is an assurance of good health and stable community. An increase of slums in an urban environment is an impediment to sustainable development. To meet the challenges of WASH projects failure, sustainability concept forms the basis for the study. Inadequate water supply and poor sanitation are the leading cause of deaths in most developing countries. Despite several initiatives by the government and other agencies through projects, sanitation remains a challenge, especially in slum areas. Efforts put by various stakeholders in upgrading the slum through water, sanitation, and hygiene projects are of no use if they stop after a period. The purpose of this study, therefore, was to establish the underlying factors influencing the sustainability of water and sanitation projects to deduce appropriate recommendations for enhancing the viability of such projects within the slum of Rhonda in Nakuru. The study was based on four specific objectives: To establish how community participation influence sustainability of water and sanitation projects; To ascertain how project management skills influence sustainability of water and sanitation projects; To determine how funding influence sustainability of water and sanitation projects; To assess how technology influence sustainability of water and sanitation projects. A descriptive survey research design was adopted for this study. The study targeted a population of 296 households. A 30% sample size was used to select respondents. The sampling technique used was cluster sampling. Data collection involved the use of questionnaires. Data were analyzed for both descriptive and inferential statistics using a statistical tool (SPSS V. 20.0).From the findings, the study established that there was a significant positive influence between community participation, Project management skills, Funding and Technology on sustainability of WASH projects with correlation values of ($r=0.671$, $p<0.05$), ($r= 0.484$, $p<0.05$), ($r= 0.401$, $p<0.05$) and ($r= 0.862$, $p<0.05$) respectively. The study therefore recommends that the community should be involved in implementation and evaluation of projects at every stage of development. The study also recommends that the government and other agencies should advocate for proper planning in the design of the new technologies. The research suggests that the same study should be conducted in other regions to enhance better sustainability of WASH projects in Kenya. It also suggests that studies should be conducted on the influence of Socio-cultural factors on sustainability of WASH projects especially on gender issues in Kenya.

CHAPTER ONE

INTRODUCTION

1.1Background of the Study

With rapid population growth within the slums, many initiated projects face the challenges of sustainability. Contextually sustainability of WASH projects in many developing countries and by extension Kenya is very poor. A closer study of slum projects in Nakuru leaves no doubt that sustainability is still a challenge. Before and after the implementation of WASH projects in Rhonda slum, the situation has remained constant. There are common cases of diarrhea and cholera among the residents, a majority of slum dwellers depend on pit latrines for sanitation needs. However, most of the facilities are in deplorable conditions and insensitive to the needs of women and children which leads to misuse and finally open defecation witnessed all over. Also, there is the water shortage, and an overall environmental condition is poor. In an attempt to solve these problems, the researcher thought of developing a proposal to address the likely factors influencing sustainability of WASH projects

According to the 2013 Human Development Report (UNDP, 2013). It recommends that to walk in the human development pathway, people should engage fully in activities that reform the lives and they should be able to participate in policy making process and results. Studies have shown a paradigm shift towards hardware interventions with regards to sanitation access (Murray & Ray 2010).A good example is the physical components that improve waste management by use of different facilities (Van Wyk 2009; Peal et al...2010; Tremolet et al...2010). The existence of WASH infrastructure without sustainability concept results in the destruction of facilities or never used at all (Mara et al. 2010). This results in wastage of resources. According to the studies conducted by Evans and Tremolet (2010). We contend that slums require sanitation services that are efficient and effective in all dimensions. Sanitation includes the principles and practices of collection and removal of wastes with a high level of dignity (COHRE et al. 2008). Studies reveal that many development projects in developing nations are faced with challenges of sustainability (Gebrehiwot, 2006).The major contributors are among inappropriate legislations; inadequate institutional support; Poor management system and improper financial mechanism (Niyi & Felix 2007).Challenges on health issues have shifted the debate globally as to whether the facilities are

improved or not (Gunther et al..2012). However other bodies like Joint Monitoring Programme (JPM) by WHO/UNICEF describes the services as unimproved.

Agenda 21 provides the basis for looking into the sustainability of WASH projects. It contends that sustainability concept incorporates environmental, economic and social issues of development that aims at enhancing the standard of living (UNDP-WSP, 2012) On the concept of sustainability, Habtamu (2012) in his research on factors influencing the sustainability of water supply systems recognizes sustainability as an indefinite functionality of the systems. Sustainability is viewed as an approach and policy programs in the development framework (Eckman, 2007). According to Brown et al. (2007), he explained a precise definition in the context of time and space inclusively. It was for this reason that scholars came to an agreement that sustainable development is critical for any community development.

Sustainable projects have the capacity to achieve their goals, continue with their principles and efforts to the extent of meeting the outcome (US Department of Labour, 2010). Many project beneficiaries confuse the fact that sustainability is about acquiring resources to continue operation after the grant period. A precise meaning of sustainability is to ensure the goals of the project are actualized through various programs which concur with people's needs (US Department of Labour, 2010).

With the preceding, a closer study of Kenya's sanitation projects leaves no doubt that sustainability is a challenge. The scenario is evident in most slums where such development projects are undertaken with little impact despite resource utilization. Situated in Rift Valley Province, Demographically Nakuru becomes the fourth biggest town in Kenya. Its population has been on the rise, with the UN Report indicating an annual growth rate between 1990 and 2006 at 13.3% (UN-HABITAT, 2010). The current population is approximately 600,000 of whom 32496 live in the slums of Rhonda. It is found within Mwariki sub-location with seven villages namely; Gikomba, Market, Jasho, Ponda Mali, Posta, Quarry, and Sewage. The population of the settlement has dwelling units ranging from semi-permanent to temporary structures. WASH projects are shared within the settlement. A good example is the bio-centre commissioned by Umande Trust in Partnership with Practical Action organizations. Efforts to improve the livelihood of residents have not succeeded much as envisioned by many NGOs working in the two slums.

Despite this problem, little work has been done on the sustainability of most WASH projects in Kenya. This poses a gap which this study sought to address through an investigation of the factors influencing the sustainability of WASH projects in Rhonda slum in Nakuru.

1.2 Statement of the Problem

Global statistics indicate that almost 2.6 billion persons including women and children lack access to sanitation and 1 billion have no quality drinking water at the beginning of the 21st century. This situation is common in developing countries. It is one of the priorities in current development circles because it touches on human health and infant mortality rates. Inadequate sanitation practices are the primary causes of disease outbreak and many deaths common in developing nations (UNICEF, 2011).Despite efforts made by governments and other agencies, improved sanitation remains an elusive dream, particularly in low-income settlement areas. (UN-HABITAT, 2011).African region records 30% sanitation coverage globally which is the least compared to other developed world by the year 2010 (WHO/UNICEF, 2012).

Sustainability is widely perceived as a valuable tool for a precise comprehension of social, economic and environmental impacts related to the way support systems of projects are designed, implemented and maintained (Thomson, El-Haram, & Emmanuel, 2011). Past studies recommend a holistic approach to management of projects to realize sustainability which comprises environmental, social and economic aspects (Carvalho & Junior, 2011).

Significant concerns to the WASH projects in Kenya and in particular slum projects in Nakuru with reference to Rhonda slum include contamination of water sources which are unreliable, community do the washing in contaminated sewage water, they throw human waste into water channels giving it bad color, smell, and taste, women, and girls wait until dark to relieve themselves which impact negatively on their health. There is poor knowledge of the links between water, excreta, and disease in addition to low capacity and poor management of the WASH facilities. Most projects initiated are not sustainable, and the communities are not involved enough in matters of improved hygienic practices. Implementation of project activities is not on track as per the program design; there is a slow uptake of the new technologies, and community cohesion is missing, environmental protection and resource conservation are reduced within the slum.

Despite funding by the government through the relevant sectors, very little has changed. Despite the effort put into highly skilled personnel and many research conducted within the slum, sustainability issue of the projects remains a major challenge. Despite improved community

sensitization, safe water and improved sanitation remain an elusive dream particularly in slum areas where the provision of services bypasses the residents (WHO/UNICEF, 2012).

Studies have shown that in developing countries, most governments supported by other agencies put a lot of investment on water and sanitation projects by providing funds (Gebrehiwot, 2006). However, the setup WASH facilities have failed after a short period. Donors continue to change the scenario through direct participation. Their financial aid is short-term and does not meet sustainability threshold as witnessed in many slums of developing countries. It is important for stakeholders who are involved in sanitation services provision for a population living in the slums to achieve their objectives of improving access to water and sanitation. The main contentious issue is the sustainability of the WASH projects.This study, therefore, focused on the various factors influencing the sustainability of WASH projects among residents of Rhonda slums in Nakuru County, Kenya.

1.3 Purpose of the study

The purpose of this study was to assess the factors influencing sustainability of water and sanitation projects: A case of Rhonda slum projects in Nakuru County, Kenya.

1.4Objectives

This study was based on the following objectives:

1. To establish how Community participation influence sustainability of water and sanitation projects
2. To ascertain how Project Management skills influence sustainability of water and sanitation projects
3. To determine how funding influence sustainability of water and sanitation projects
4. To assess how technology influence sustainability of water and sanitation projects

1.5Research Questions

The following questions guided this study:

1. How does Community participation influence sustainability of water and sanitation projects?
2. How do Project Management skills influence sustainability of water and sanitation projects?
3. How does funding influence sustainability of water and sanitation projects?
4. How does technology influence sustainability of water and sanitation projects?

1.6 Significance of the study

The study contributed significantly to our knowledge of the factors influencing the sustainability of WASH projects. It could help the government in informing various stakeholders on how to collaborate towards sustainable development.

The study could provide insight to donors and NGOs in the design and implementation of sustainable development projects that will improve human livelihood in the slums. It would also guide a network of stakeholders charged with the responsibility of managing urban environment towards proper planning. Since the research area captures many issues affecting the sustainability of WASH project, it would help generate baseline data for monitoring and evaluation of how well the challenges of sanitation should be addressed during the project cycle so that the needs of the community and the government are in harmony. Finally, future researchers could use findings as a secondary source of information to guide their research.

1.7. Delimitation of the Study

This study focused on factors influencing the sustainability of WASH projects, implemented within Nakuru especially Rhonda slums. This study was delimited regarding population to the residents within the slum. The study targeted a population of 296 households. The sample size constituted 89 households. Beneficiaries of these projects were included in the survey since they have a direct relationship to the projects. Key informants included staff from NAWASCO, MoH, Practical Action and Umande Trust Organizations

1.8. Limitations of the Study

Limitations of this study were related to external validity and length of study. The researcher took caution in interpretation since personality measures are susceptible to measurement error. The researcher could encounter a challenge in eliciting information from the respondents to those questions which were subject to areas of feelings, emotions, attitudes, and perception, which cannot be verified objectively. In meeting this challenge, respondents were assured of the anonymity of their responses.

The choice of instrument that was used could give varying data depending on the individuals used against. This challenge was overcome through a pilot study that ensured all the questions were relevant.

This study might not be generalizable to other areas because of environmental and cultural differences. However, the assumptions provided under theoretical framework were used to represent other regions.

The response rate for this study could not be 100%; The respondents would be reluctant in giving information for fear of intimidation. There was the need to carry an introduction letter from the relevant Institute. The researcher assured the respondents of confidentially of their response.

1.9. Assumptions of the Study

The study assumed that the selected sample size represented the study population. It also assumed that the data collection instruments were valid and reliable and that the data were relevant to the research. To the respondents, it assumed that they were objective and competent in answering questions correctly and that their response was correct assuming that all of them were literate.

1.10 Definitions of Significant terms used in the study

Sustainability: The ability of WASH services to continue working indefinitely with prescribed benefits.

Sustainability of WASH projects: Refers to the management of WASH projects in a manner that ensures benefits for both current and future generation.

Sanitation: Implies all conditions relating to public health

Slum: Implies any informal settlements or unplanned housing units.

Community Participation: Refers to the level of engagement of the locals in action or situation towards the development projects

Project Management Skills: Refers to using expertise in pulling up people's effort to achieve desired goals and objectives for a project by using available resources efficiently and effectively

Funding: Implies the finance or the administrative function that make it possible for the project to operate effectively.

Technology:	Refers to the choice of sanitation system established by use of scientific knowledge for purposes of meeting communities sanitation demand
Project:	Tangible undertaking that has an objective of meeting community needs and aspirations within a specified budget and timeframe.

1.11. Organization of the Study

The study was organized into five chapters. Chapter one contained the introductory in which various aspects were discussed. These include background, statement of the problem, the purpose of the study, Objectives of the study, Research questions, Significance, Basic Assumptions, Limitations, Delimitations and definitions of significant terms used in the survey. Chapter two focused on the review of relevant literature. A theoretical and conceptual framework was formulated and discussed and knowledge gaps identified. Chapter three outlined the study methodology that was used to obtain information addressing research questions with the aim of achieving research objectives. The section went ahead to describe the study design, sampling procedure, methods and instruments used to collect data and finally techniques of data analysis. In chapter four the areas of focus were data analysis, interpretation, and presentation. Finally chapter five involved study summary, conclusions, recommendations and areas for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviewed the relevant literature with particular reference to the four objectives and how they related to sustainability of WASH projects in Nakuru county. The process of reviewing the literature involved academic sources such as books, journals, electronic library, national policy papers and past research studies. The chapter also looked into the theoretical framework that guided the research, followed by a conceptual framework and the knowledge gap that necessitated the study.

2.2 The Concept of WASH Projects Sustainability

Sustainability emphasizes on the functionality of projects over time. There is no definite time limit attached to these projects. In the context of WASH services, it explains the continual gain that brings a long-lasting change to the society. The debate surrounding the concept of sustainability is considered beyond technology. The goal of sustainable development is anchored in various aspects, namely; economic, social and environmental pillars (Jansz, 2011).

The concept of sustainability has been used to show how turbulence of the environmental hinders other systems like economic and social. A fundamental question derived from sustainability concept is whether programs of human are self-reliant. The figure below illustrates the scheme of sustainable development

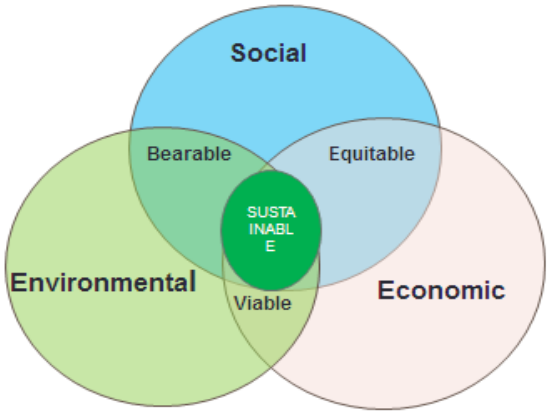

Figure 1: Scheme of sustainable development

The concept of sustainability was first realized in the report of 1972 termed, “Limits to Growth” its publication followed, and it was worked out as the leading benchmark of International action through the collaboration of various bodies like United Nations Environment in the 1980s. The first definition of sustainable development was echoed in the Brundtland Report in 1987 which defined it as development that meets the needs of the present generation without jeopardizing the ability of the future generation to meet their own needs

Sustainability theories have been described using terminologies like weak, ecocentric or anthropocentric making it too complicated. The current model considers sustainability by what should be sustained. The models of ecological and economic are not mutually exclusive as they usually complement each other (Carvalho & Junior, 2011).

The Economic model of sustainability regards opportunity as a form of capital. Robert Solow, an economist, suggested that sustainability should be viewed as an investment problem whereby returns are used to create new opportunities for greater value.

According to Bellagio principles which focus on sustainability and sustainable development in sanitation and wastewater management, he proposes alterations in sanitation practices and policies which are grouped into four principles. The first principles emphasize on the holistic well-being of human together with environmental security that should be prioritized in the new approach; it should be responsive and accountable to the local demands. It goes further to explain that solutions should focus concerns of social, economic and environmental; Protection of the environment to the community and economic opportunities for waste management should be enhanced (Carvalho & Junior, 2011).

The second principle is tailored towards good governance in which decision-making should incorporate participation by all stakeholders. It argues that decisions at each level should focus on informed choices, service incentives should be in line with the goals and objectives of the project and that the wider community responsibility should balance consumer's right.

The third principle is on waste management. Waste should be considered as a resource; its management should be holistic which include integrated water resource, the flow of nutrients and all processes of waste management. He proposes that there should be reduced input to enhance efficiency and environmental security.

The last principle talks of the domain in which environmental sanitation problems are resolved. He proposed that it should be kept at a reasonable size within the household and wider community. This principle advocate for the management of wastes that should be close to the source; Little water should be used for the transportation of wastes and additional technologies be employed for sanitation interventions.

This model is similar to the sustainability of WASH system which is impacted by the interaction of different factors including environmental, social and economic. Water, sanitation and hygiene programs should incorporate structures and systems that monitor the functionality of the facilities to ensure sustainability.

This study aimed at the implementation of WASH projects within the slum area, projects sustainable development involved continual beneficial effect going past project period and it is integrated regarding time and space. Most programs remain to stand alone and are adopted by the locals without much external intervention (Eckman, 2007).The study sought insight and knowledge on the implementation of WASH projects regarding their sustainability. The rate of success of many projects increases as a result of ownership by the community. They manage their schemes through an establishment of a proper structure obtained through training. WASH projects do well where there is the protection of water points, cost recovery for operation and maintenance and appropriate technology used. This study, therefore, focused on the factors influencing the sustainability of WASH projects in Nakuru particularly Rhonda slum having in mind that such projects are vital to development in the area.

2.2.1 WASH Project in India

In Tiruchirapalli District of Tamil Nadu State, in southern India exist a sanitation project for the eight slums in the region. The residents have dry latrines with only two toilets with septic tanks installed by the authority from the municipal. However, the facilities had turned unserviceable because of poor maintenance by the responsible stakeholders.

A report was made by women concerning the poor maintenance of latrines. The facilities became the source for fecal worms which could be located nearby water sources and inside houses. There was a severe disease outbreak due to poor sanitation; families were affected by an increase in medical bills.

Community leadership which comprises of men did not take any action to provide improved facilities. The government failed to provide essential services to the community not until they collaborated with an NGO which responded to their needs. To address the situation, the state authority made a proposal involving NGOs to promote community participation and education in matters of sanitation. The project was formulated with a source of the fund from Water Aid. The funding enabled the project to reach 25 informal settlements in various communities with advice from the local authority.

Prior experience in WASH projects was found in rural settings. The community particularly women became the center stage of change and dissemination of information. The design of the project required an installation of water facilities and toilets. Water Aid decided to cater for the expenses of installation while the government decided to provide project site, water supply, electricity and loans to members of the community.

Key results of the project included income generated from pay and use toilets; creation of innovation; women empowerment; behavior change on hygiene issues; improved sanitation facilities and finally community involvement including men.

The key reasons why this remediation project was sustainable were: There was gender mainstreaming in the whole planning process of the project, women were able to form self-help groups with saving and credit schemes; There was an open discussion with the community in terms of benefits of the project; There was capacity building in the subject of accounting and reaching out for government services; Development of sanitation system for all was enabled, and lastly there was collaboration among various stakeholders including the government, NGOs, and the community.

Some of the obstacles to this particular project were; the slow pace of the community in taking up the idea; there was the lack of proper help by the past governments. Their usual work was to contract companies to set up sanitation facilities without adequate consultation or any participation by the community

Looking ahead at the sustainability of this project, it is clear that community engagement and funding were key factors that influence the viability of the WASH projects.

2.2.2 WASH Project in Egypt

In the village of Nazlet Fargallah found in upper Egypt, a water and sanitation project was implemented in the year 2004. The project targeted 700 households without sanitary facilities among whom 60% were women before the project; a total of 1500 family did not have access to adequate sanitation including clean water. They suffered illnesses which were directly linked to poor sanitation practices. Women were charged with the responsibility of providing their families with drinking water and means of waste disposal. Before the project, their primary water source was communal hand pumps which did not serve them adequately.

Major concerns to the community included contamination of water sources, they used to wash clothes and dishes in contaminated sewage water, they threw human waste into water channels giving it bad color, smell, and taste, women, and girls had to wait until dark to relieve themselves which impacted negatively on their health. Also, women could make long trips during the day wasting more time they could spend in household activities.

The community of Nazlet approached BLACD for assistance to change their pathetic situation. Later WASH project was commissioned which had three components: Installation of latrines; water connections and promotion of education on hygiene matters.

BLACD began by increasing awareness level of the community concerning water and sanitation; they offered training on health issues as well as skills of communication. Everyone participated in project planning at the household level.

Key results of the project impacted on the health and sanitation. BLACD was able to provide 700 households with at least two water taps and latrines each; awareness level of disease prevention went high leading to a positive change in behavior. Women have successfully integrated into the project despite a traditional male dominated society. Lastly, there was a sense of pride, women security, and self-sufficiency at the end of the project.

Challenges set in when the project was finally left under the management of the community. Existing power structures could not allow women to take part in decision-making at the management level. Initially, the project was welcomed by all leaders in the village even though they did recognize women leadership which became apparent later on. Despite all these obstacles

the development team that was set as a result of the project became formerly registered, and they championed for a change.

Key factors for success was the provision of an efficient model active participation by all in water and sanitation programs.The project recognized the role of women in ensuring services at the household level

Looking critically at the sustainability of this particular project, it has demonstrated that it is possible to respond to community needs while promoting changes in their roles and participation. The development association formed has ensured continuity of the project which has benefitted the community as a whole.

2.2.3 WASH Project in Kenya

In Fafi Constituency, Garissa County Kenya a study was conducted by Kamau (2015) to establish factors influencing the sustainability of water, sanitation and health projects implemented by Sustainable Development and Peace Building Initiatives. The target population for the study expected beneficiaries and employees of SYPD. This particular NGO has been listed among the best performing NGOS in Kenya by the United Nations. It undertakes several humanitarian projects in Somalia and the whole region of Northern Kenya

The research scope was on projects sustainability and to identify significant challenges that NGOs are faced with to come up with a lasting solution aimed at improving the standard of living. The study also addressed the effect of community participation, utilization of funds, technical expertise and political factors on the sustainability of the WASH interventions (Kamau, 2015).

On community participation, the study pointed out various activities undertaken by the management committee in boosting participation. Experts from different fields were found to be essential in enhancing projects sustainability. Findings also revealed discontinuity of project with donors fund withdrawal. There was clear evidence that most projects were not self-sustaining after withdrawal of funds by the donor (Kamau, 2015).

On technical expertise, the study revealed that the management system was effective since many people had undergone training relevant to the project works. People were committed and competent in their fields (Kamau, 2015).

On funds utilization, there was the timely disbursement of project funds. The timelines and policies set by the donor were useful. However, the study revealed that the projects were not sustainable since they would stop after withdrawal of donor funds. Inadequate resources result in a failure of projects and deprivation of long-term rewards. Funds limitation also leads to little or no accountability in the project implementation (Kamau, 2015).

2.3 Community Participation and sustainability of WASH projects

According to Marsden (2007), community engagement is an integral part of stakeholders support. Involvement of the community plays a critical role in the water supply systems sustainability. There is an increase in Sustainability rate of projects due to ownership and management schemes at the community level. Chappel (2005) supports the fact that community participation increases project efficiency. In his study, he recommended that there should be adequate community involvement during the planning stage of the project. Community participation is described as a process by which various individuals from all sects take control of decisions which affect their lives. It involves collaboration of both men and women in decision making, design and implementation of the projects (Mushtaq, 2004). Participation of the community increases project effectiveness because of the objectives which are met and the benefits to the society. It also helps in building beneficiary capacity through active participation and training during project planning and implementation

Communities willingness to participate both socially and economically is a good indicator of the need for improved water and sanitation service (Bhandari & Grant, 2007). Referring to the findings of Mbata (2006), when the community interest to pay for particular service increases, it implies their awareness towards ownership also rises for the services. Similarly, when members of a given family cooperate by giving cash and through labor necessary for the services, then it can be concluded that the service they receive from the source is of significance to them thereby promoting its sustainability.

According to Van (2008) women, involvement in water and sanitation projects have a significant impact on the community. Research conducted on community water and sanitation projects in fifteen countries revealed that women involved in specific projects were more sustainable as compared to those projects where they did not participate. This gives emphasis to the result by the World Bank where women participation was linked to water and sanitation projects effectiveness.

The women are become active in decision making, providing education to children on matters of sanitation and hygiene, the building of capacity in the community and mobilization of political will (World Bank, 2010).

Community participation is essential in all sanitation projects implemented within the slums. It involves creating an enabling environment for the community to assist one another. By collaborating and making use of their skills and resources, they are capable of moving away from poverty towards sustainable development. Community participation is that process where stakeholders from all sectors of the community influence decisions which impact on their lives. This will entail participation of beneficiaries, both men, and women in design, implementation and decision making of the project. (Keen, 2007)

To enhance community engagement, International Rescue Committee (2012) suggests that regional educational centers are established and every move documented in regards to information, good practices, and innovation. The community should focus on capacity building and linkages on increased participation in resource management specifically water to achieve the desired sustainability.Regional learning should also be enhanced and used to promote community commitment in the administration of resources. Modalities should be worked to institutionalize learning as a strategy for identifying best practices on innovation and information sharing (Baur & Woodhouse, 2009). It is also an avenue of influencing policy issues at the national level.

Research conducted by Mclvor (2008), on water and sanitation programs in the Zambezi Valley, revealed that there was the total failure because the local people did not regard the facilities. They considered such projects as originated from outside hence was not their responsibilities to take part in any activity. Further investigation revealed that there was little community involvement before establishing the facilities; people were left with an impression that they do not belong in the management function of the project. This absence of ownership changed the services to appear like open access resource (Harvey & Reed, 2007). The communities were also separated by the technology utilized. It was not regarded as a village level regarding operation and maintenance in most programs (Mwakila, 2008).

In a study undertaken to assess the influence of community participation on a water project performance in Kiserian. It portrayed a low level of participation all the way from identification,

planning, implementation, and monitoring stage. All those processes influenced the overall performance of the project negatively (Mukunga, 2012).

On stakeholders ownership, a study conducted by Pollnac and Pomeroy (2005) revealed that many projects fail to bring sustainable benefits because of lack of good will by the stakeholders, they do not show ownership and commitment. Genuine community participation is not well discussed if the main agenda is only running programs which are not transparent. Some practical steps to achieve sustainability suggested by Pollnac and Pomeroy (2005) include ensuring that the design phase is given adequate time and resources and is regarded as an investment in a successful outcome; ensuring that the design involves activities required in the implementation of participatory strategies; Clearly outlining the roles and responsibilities and who is expected to benefit; defining the level and type of participation to be realized and finally ensuring that the team are competent enough and skilled in participatory approaches.

However, when projects are executed in partnership with different agencies, it is crucial for sustainability that agencies have an agreement and that there are elaborate channels for giving out resources and receiving feedback. This in most cases is important when the national level body ability is limited to active communication and quick action on the ground (Asamoah,2003).

Communities should participate in all stages of the project development, by doing so, long lasting solutions are found that fit their requirement including resources. Instead of external influences, different agencies should strive to solve communities' problems. Participation is significant especially at the onset of the project. With clear understanding of the system, community will be more concerned and committed to service delivery and feel a sense of ownership. This study will, therefore, focus on factors influencing sustainability of WASH projects in Nakuru County due to recognition of the fact that such projects are fundamental to the development in the area.

2.4 Project Management Skills and sustainability of WASH projects

Project management incorporates proper alignment of activities with the needs of the community. Coordination of activities takes place at different levels including local, national and international with the aim of improving ownership and efficient service delivery. It focuses on providing leadership to meet specific objectives. According to Weinberg (2008), community-based projects are complex in nature and require different management skills to handle. In his study McDade (2004) contends that good management will ensure that adequate local resources and human

capacity are in place to sustain the project without external intervention. During the implementation stage of the project. Kirsch (2000) suggests that a project management team has to be equipped with technical expertise related to the project apart from project management related skills. Some of the activities conducted during project implementation including but not limited to identification of the scope, gathering requirements, resource management, relevant training, budget, and schedule estimation, advising on technical architecture, risk management, and preparation for risk mitigation.

According to Bloom (2006), a Project Manager is expected to have a clear understanding of the objectives of the project in operation. Prior studies have shown that comprehension of project task helps to increase performance and improving sustainability of the project (Goodman & Leyden, 2001). Studies conducted by Swanson and Beth (2000) reveals that the relationship between the project manager and the project extends beyond technical skills but also to other characteristics like exposure to the methodology experience. In most instances, a project manager is the most senior person with a sounding board for architectural and technical decisions made related to the project. Initial experience to the project attributes like methodology would make the work easier to the project manager thereby improving sustainability of the project (Baker & Slaughter, 2000). Past studies have also revealed that those with excellent management skills will make good leaders and therefore organizations are likely to prosper through their leadership (McDade, 2004). Specific nature of leadership is uncertain to variables like satisfaction of subordinate, commitment and finally performance of the project. Leadership does not remain unexplainable concept since not all leaders make good managers. According to Espinosa, et al. (2007), understanding the work is critical to the success of a community project which is linked to sustainability and performance. Therefore to establish the influence of project management skills on sustainability of WASH projects, leadership should be separated from management.

A study conducted by Kirsch (2000) indicated that project management team should have the self-esteem of influencing those they interact with to achieve sustainability. It implies that projects managers should not only possess sound management but appropriate leadership skills too. The team has to extend interaction to many stakeholders, management should not be confined only to internal project activities, peers, and superiors but should go beyond the actual beneficiaries who are the clients to the project. The team should incorporate skills that are essentially not technical and can be understood by many like customer handling skills. Within project teams, as one

advances into managerial roles, the skills come into play which helps in effective project management. Other skills are tacit and gained through experience. Good examples include self-management, managing others and career. The difference between a novice and an expert lies within job performance in professional and managerial career pursuit. According to Kirsch (2000), project management requires both hard and soft skills. Examples of hard skills will incorporate technological skills, domain expertise, and overall experience and management skills like planning, monitoring and risk management. As prior research has found (Byrd & Turner,2001) both soft and hard skills are essential for IT professionals to obtain good performance. However, no study has measured the direct impact of project management skills on the success of the project.

While the skills play a significant role in establishing project performance, the project team also play a crucial role. Familiarity among team members with each other minimizes effort of coordination because familiarity can provide relevant information about the activities and task stakeholders (Espinosa et al., 2007). A study by Boh et al. (2007) contends that when team members interact with each other during project implementation, they establish a road map of expertise. Further studies by Pagell et al., (2000) reveal the relationship between personnel management skills and success of any project. The study assumes that there exists a relationship among project performance, organization, and the context. It anticipates influence between skills of an individual and performance of the project. The researcher found out that there is a significant impact of fit on management expertise and environment on the general performance of the project. It is therefore advisable that project managers link resources to the project needs. Any deviation from an optimal pattern of resource allocation should be related to performance and project sustainability.

2.5 Funding and sustainability of WASH projects

Availability of finances is fundamental to the success of WASH projects. Yang and Jackson on their research findings of stalled pumped-hydro energy storage conducted in the United States revealed that financial uncertainties were a limiting factor for many projects (Yang & Jackson, 2011). Based on capacity assessment of the local community to meet the costs. The concept of an ideal project management considers sustainable resource utilization regarding whether some assets should be replaced or maintained. It helps majorly in price monitoring that ensures project sustainability after a period (Yang, 2011).

Financial viability has three significant aspects which include: availability of adequate funds to finance project cost, particularly funds drawn from the government budget, project expenditure recovery from beneficiaries and appropriate incentives that ensure delivery of the project. Also, a financial plan is necessary to ensure there will be enough funds to finance project requirements, particularly funds obtained from government budget and other incentives required for participation in the project. In an ideal situation, it applies to the duration of execution to ensure enough capital is available for the investment and other requirements. For those projects which do not produce sufficient funds to cover operating expenses. The calculation should be done for the fiscal impact of the project for every step of its development (Sneddon, 2006).

Agencies are reported to increasingly appreciate the fact that income obtained from the sale of items becomes an additional source of funding that satisfies other fundraising strategies while enhancing sustainability issues. Some factors can result to the viability of any project. These will include proper planning, strong partner relationships, monitoring and communicating the progress impact and finally, stakeholders continued funding at an early stage. This could also involve diverse funding packages for development with several income streams

Khan and Hare (2005) on their study emphasized the fact that to ensure sustainability of NGO funded project, institutional framework must be improved which is based on enough funding. NGOs must build up reliable systems to enhance good reputation to the implementing body. They also need to foster good will on people and support development plans for sustainability (Bradshaw, 2004). Foundations that source their funds from a single donor are usually left in jeopardy. Having discretionary funds from generated income gives the organization an opportunity to venture into other programs. In most cases, they are those activities that potential donors take to be highly risky. Also, earning income does not qualify financial stability to an organization (Schneider, 2007).

Studies have shown that sources of finance are attached to sustainability of projects. Ayodele (2011) pointed out in his findings that a critical failure in many development projects in Nigeria was as a result of inadequate funding and finance. A similar confirmation was by Kasoo (2010) who mentioned that apart from community participation, funds availability has a bearing on successful implementation of a project. Further researchers have confirmed the idea of funding as a pillar of sustainability of projects. A sustainable approach to cost funding is necessary for operation and maintenance of projects.

Further research on financial sustainability conducted by Rono (2008) explains the dependence on donor financing of most NGOs projects; there was a little utilization of internal resources with the poor return rate of services. This study will aim at developing a realistic approach towards funding based on community assessment to meet the costs. The project management should put into consideration the options of maintenance and replacement of assets, and whether the depreciation funds should be set aside. This would help a great deal in risk mitigation and enable the project to become sustainable eventually.

2.6 Technology and sustainability of WASH projects

Past research has revealed the impact of technological choice on projects sustainability especially on water supplies and sanitation issues. Different professionals within the sector have adopted a new way of describing cost efficient, simple technologies that suit local conditions and are managed by the community. Appropriate, progressive, alternative, Village level Operation, and Maintenance technologies are a few examples of them (Brikke,2003). These researchers argued that projects must include proper technology and integrate operation and maintenance into the development of the project from the initiation stage. They proposed the involvement of sustainable technology at the community level.

Performance analyses of WASH systems in many countries revealed improvement in communities where households were able to decide on appropriate system type and service level they required (Brikke,2003). Among technical factors proposed to influence sustainability of services are choice, complexity and technical capacity of the technological system. The design of the system and complexity of the technology have a direct link with the relative weighting of these factors (Harvey, 2007). Sustainability of facilities provided is modified by incorporating the private sector in the service delivery to the community and stressing the idea of sound financial management. All the above can be implemented when proper legal and institutional framework is in place. Clear policies and strategies must be in place at the national level that supports sustainability (Brikke, 2003).

Community pattern of settlement influences technology choice of water supply. A good example is the hand pump system which would serve very few people in the settlement. Underground water quality also impacts the selection of technology. A classic example is an option for a diesel

powered system, and a hand pump based system will be influenced by the population size and water depth respectively.

Project managers have always supported the place of technology in the performance of a project, production process, and human welfare. Continuous economic crises and many project failures are due to poor management and accountability issues which strain limited resources (Hagedoorn & Cloodt, 2003). Sustainability has, therefore, become significant in any project implemented within a community; It is developing slowly and turning out as the solution to most project failures. Many community-based projects are pulling up huge resources in ensuring that the information systems are in place. However, some of the technological advantages like improved productivity depend upon the level of integration of technology into objectives of the project.

Adoption of technology is crucial in sustainability of water based projects as it enhances operations and maintenance. Management of such projects at the community level is not satisfactory if there are an inadequate resource and poor support of the system (Binder, 2008). Innovation in technology has tremendous impact on WASH projects. It is a major factor that influences improvement of performance thereby ensuring sustainability of projects. Numerous technical changes in the sector, it is apparent that the capacity of an organization to come up with a new product and service significantly influence on sustainability (Hill & Rothaermel, 2003). Several studies have shown a direct link between technology choice of a project and durability and made a conclusion that technological innovation improves the performance of the sustainability. The economic value of most community projects is obtained from intangible assets (Dunning & Lundan, 2010).

Technological innovation is crucial for sustainability of WASH projects through driving of performance. Different meanings are attached to innovation performance. In the broad sense, it implies knowledge of technological, inventive and innovative operations. Similarly, it can be described regarding product performance and process performance. A return bridge exists between those who embrace technology and those that resist it (Hopkins & Brynjolfsson, 2010); therefore, innovation is usually associated with technologies. Similarly, WASH projects that support technology produces better performance and sustainability than those who do not.

The advances in information technology have significantly altered the way computerized information system works in projects implemented within the community. The role of IT in

service-sector firms and its influence on the effectiveness of the company's operations and sustainability have been noted (Rubenstein & Greisler, 2000). Technology can support many processes in such community-based projects. It facilitates automated admissions into the project for those who were not present at the inception. Also, through technology, it enables extraction of the information that improves communities' satisfaction. This ensures efficient service delivery to the people.

Technology and operation are connected to the functionality of the systems as well as their adaptability. Appropriate technology choice brings sufficient community demand and makes them have adequate information about water supply and sanitation solutions. Technology becomes sustainable when it addresses many issues to do with suitability, responsiveness, acceptability, quality standards, servicing needs and costs.

Choice of technology must also be adaptable and durable; it should make use of the local materials and allows simple repairs and maintenance by local experts. It calls for readily available spare parts from within the country to avoid unnecessary expenditure of importation. The chosen technology must also be in line with the community's socio-cultural standards. Issues to do with site selection of the project and location of WASH facilities are critical issues that the community must address to ensure sustainability. Servicing requirements of the chosen technology should be simple and pocket-friendly since the choice of technology directly affects peoples' willingness to pay as well as continued use of the system.

2.7 Theoretical Framework

The proposed study will be guided by two underlying theories including the Citizen Participation theory and Community Coalition Action Theory (CCAT)

2.71 Citizen Participation theory

Citizen participation is a process which provides someone with a chance to manipulate decisions made by the public which is purely democratic in nature. The history of public involvement began with ancient Greece and the government of colonial England when procedures were designed to promote external participation. Citizen participation was formalized in the 1960's. The theory states that participation is an integral component of any community development activities.

Spiegel (1968) further demonstrated that citizen participation process could involve programs that facilitate ownership.

In Plato's Republic, citizen participation was practiced in implementing various programs. It was embedded in Platos's concept of freedom of speech and equality by all. This has advanced over the years to form basic pillars upon which the United States was established. This theory is purely based on democracy. The assembly state in America was outstanding in involving citizens in decision making on several issues not until the number of people grew to make it difficult to participate in all programs. It later turned out worthy to involve representatives from the community groups to champion their grievances (Christen & Robinson, 1980).

In as much as the concept of citizen participation has gone down, opportunities still exist within the community for members to get involved in decision making directly. Volunteer groups operate as links between individuals and the entire society. Bringing community on board in programs implementation enhances dignity and self-sufficiency of individual citizens. Community involvement also advances plans of the project together with leadership; it minimizes the cost for personnel who implement various components of the project.

The theory of citizen participation assumes that community members are reluctant to participate in project implantation when proper information is missing which would make them act responsibly. Education as a factor also influences their participation with those who are less educated to feel intimidated. Participation is grounded in certain principles like obvious positive benefits, better knowledge and finally comfort within the groups.

Application of citizen participation theory is relevant in the implementation of community managed WASH projects through beneficiaries' involvement in project execution processes. The approach of involvement by all regarding decision making will lead to ownership and eventually sustainability of the project.

2.7.2 Community Coalition Action Theory (CCAT)

One of the theories that will guide this study is the Community Coalition Action Theory (CCAT) by Butterfoss and Kegler (2002). It focuses on many factors that influence a community coalition's capacity to undertake its essential functions of forming a collaborative entity, community capacity building and fostering change at the local level making it significant in

coalition evaluations. The theory builds on models and frameworks like Community Organization and Development Model, Partnership for community development model, organization viability model, Promotion of Health and community development framework, Community structure and building typology and the context of Community Health Governance

This theory forms the basis for continuation of community coalitions from initiation to institutionalization and incorporates a cyclical feedback mechanism to accommodate new issues in regards to changes within the community. The theory also considers different factors which influence on community coalitions including social, political climate, history and values.

The CCAT starts at the level of formation where the party charged with the responsibility of leading enters into a collaboration to respond to community demands. The next step is the recruitment of coalition membership where leaders are appointed to establish the coalition's operations and processes. It is through these means that decision making, conflict management and mechanisms of communication are established. Structures are formal regulations that enhance coalition's activities. The components promote synergy within the bodies of coalition.

The next step is the maintenance stage; it incorporates gathering resources to maintain its activities, members engage each other constructively with proper strategies. The final stage is the institutionalization stage; this is where appropriate strategies like community policies and practices can promote community change outcome which has the capability of increasing the ability to its own needs. The community coalition may involve its activities from within the framework. In the whole process, coalitions may return to the previous stages to react against changes.

The CCAT elaborates different coalition attributes including leadership, membership, and structure that influence a community coalition's capacity to bring changes to the community. The theory explains the idea that a coalition's strategies can build community capacity outcomes together with health and social issues.

2.7.3 Significance of theoretical frameworks

Community Coalition Action Theory (CCAT) explains various stages of community coalitions from initiation to institutionalization. At the initial stage, community members form alliances also termed as Community Based Organizations with the aim of enhancing WASH accessibility. It is at

this juncture where modalities of WASH projects are created which involves preparation and approval of bylaws to guide the governance and leadership of the community. Execution stage includes design for the WASH projects and construction of the facilities to meet the demands of the residents. It is best realized when members of the coalition fully participate in decision making about the technology to be employed and by making direct contributions in the form of cash and other means. The institutionalization phase incorporates maintaining the endeavor by good management to ensure sustainability.

The CCAT model advocates for fourteen constructs based on the stages of development beginning with formation, maintenance and finally institutionalization. Key factors considered in the model include decision-making, leadership, communication, and capacity building among others. Participation of members and quality of action plan indicates coalition effectiveness (Butterfoss & Kegler, 2002).

These constructs provide an avenue of ensuring sustainability is achieved from idea conceptualization to post implementation. It is important that community participation and proper management skills be incorporated into the sustainability action plan of WASH projects. The two proposed theories demand active community involvement in the various project levels. Much of the theories can be considered appropriate in the implementation of slum WASH projects by involving beneficiaries in every process of implementation.

2.8 Conceptual Framework

This section contains a structural narrative describing the relationships between the variables of the study. The framework has possible underlying factors influencing sustainability of WASH projects. The conceptual model is a conceptualization in functional form. It shows the four independent variables on the left and how they influence the dependent variable on the right which is the sustainability of WASH projects.

The components which have been conceptualized as independent variables include Community participation whereby the knowledge and authority that the community has should translate to their involvement in the project to ensure sustainability. The community will take part in decision making and will be responsible for various activities from project initiation to completion. The second concept is project management skills whereby comprehension of project task helps to increase performance and improving the sustainability of the project. The third concept identified funding. Sufficient funds with proper management will determine the level of sustainability of the

WASH projects implemented within the two slums. Lastly, technology applied is related to the above concepts in the sense that the choice of technology should be environmentally friendly, acceptable by the community and easily affordable to ensure sustainability of the projects.

The dependent variable for the study which is sustainability of WASH projects interplays with the intervening variable like natural events which are beyond human control. How these events are controlled matters a lot and affect the project either positively or negatively. This is a factor that cannot be manipulated and therefore will influence the sustainability of the WASH projects. The illustration on the above concepts is as shown in figure 2.

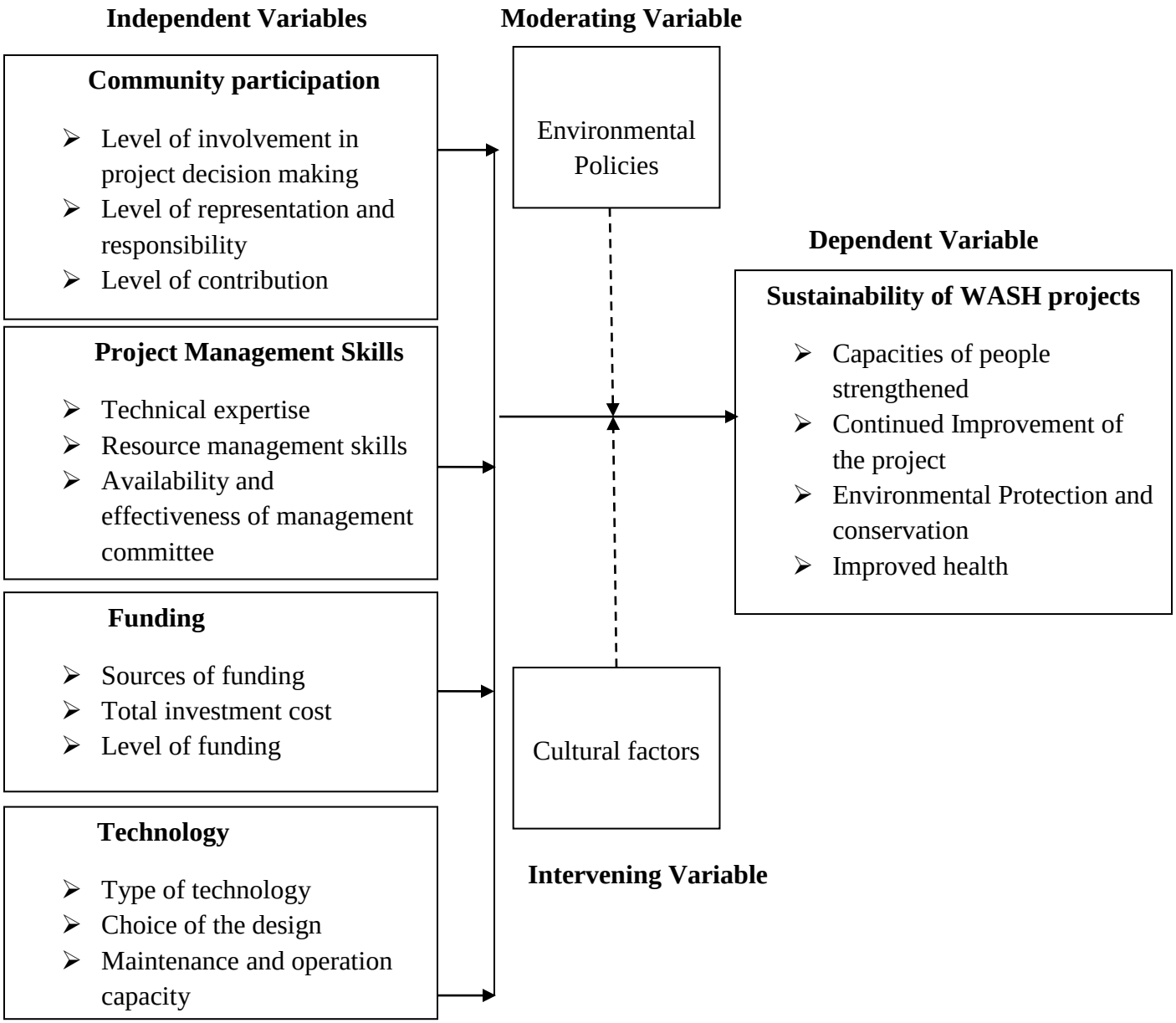

Figure 2: Conceptual Framework

2.9 Knowledge Gap

Extensive literature is reviewed on factors that have been suggested to influence sustainability of WASH projects. Studies have documented a myriad of local experiences and proposed factors necessary for a sustainable system. A few examples include a study conducted by Ayodele (2011) entitled a conceptual framework on self-reliance in community development in Nigeria which revealed that the primary cause of projects failure was because of inadequate funds. This particular study applied inappropriate analytical method. Samples taken were restricted to only one state in Nigeria. It did not involve a cross-sectional analysis to ascertain the authenticity of the results.

According to Kasoo (2010) on his research entitled International NGOs and Sustainable Agriculture found out that it is necessary for donors to collaborate with the government who determines their operations before committing to any project, Coordination between stakeholders is crucial to achieving the success of a project especially when policies are implemented. However, this study did not explore much on WASH projects as it concentrated only on agricultural projects

Based on the studies by two scholars Khan and Hare (2005), their findings revealed that sustainability of projects should aim at developing a stable institutional framework with sufficient funds. This particular research never addressed the sustainability issues in detail. Further studies conducted by Gebrehiwot (2006) on the investigation of the challenges of sustainable rural water supply found out that sustainability should be promoted through appropriate transfer of knowledge. However, this particular research was only limited to water projects and not expanded to touch on sanitation and hygiene issues.

According to Yang and Jackson (2011) in their study of promoting practical sustainability, they found out that commercial sources were the major setback in ensuring sustainability. This finding from the survey is not satisfactory in the sense that it only focused on large projects championed by IMF and USAID, it is also limited to addressing only one variable which is project financial not taking into consideration other factors which influence sustainability.

In Kenya, several studies have been conducted on sustainability in WASH projects; however, no comprehensive study is documented on the factors responsible for the lack of durability. Moreover, there is lack of empirical studies to ascertain why non-sustainability exists.

A major weakness noted from the literature is that many sustainability studies targeted rural projects and most of them were done based on performance measurement disregarding key issues

in sustainability. These studies have not also assessed Rhonda slum found in Nakuru County in particular.

2.10 Summary of Literature Review

This chapter has reviewed at length various concepts of sustainability about the four objectives It has highlighted that Sustainability involves continual functionality of water and sanitation projects indefinitely. The idea of sustainability has been used to show how challenges of the environment may hinder the stability of economic and social systems. It involves conventional approaches while adding a long-term perspective. The chapter has also explored the two theories that will guide the study. These are citizen participation theory and Community Coalition Action Theory (CCAT). It has a conceptual framework that includes the independent variables, intervening variables and the dependent variables with their indicators. Finally, the chapter closes with identification of the knowledge gap. Efforts have been put to realize sustainability of WASH projects with little achievement. This has pointed out a difference that the study will explore through the four mentioned specific objectives of establishing the influence of community participation, Project management skills, funding and technology on WASH projects sustainability in Nakuru County, Kenya

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section outlines the methods that were used in the study. It presents the type of design that was used, the target population, procedures in sampling, methods of data collection and analysis. Also, it discusses how reliability and validity of the research were ensured and lastly operational definition of the variables.

3.2 Research Design

A descriptive survey research design was employed for the study with both qualitative and quantitative approaches. The design is appropriate for extensive research since it allows for collection of information through administering questionnaires to a sample of individuals. It is a good design since the unit of analysis selected will be the community WASH projects in Nakuru County. This design incorporates descriptions of the characteristics, attitudes, possible behavior and values of a given phenomenon. In this regard, the researcher considered it most appropriate in assessing factors influencing sustainability of WASH projects. The design is most appropriate when conducting research to a large population since it provides room for generalization of findings of the study sample to the larger target population (Orodho, 2003). A descriptive research design is employed when the challenging situation is well established. Design choice allowed for accounting, proper description of events and persons. The design type formed relationships among variables and gave explanations and descriptions relating to the study. (Mugenda & Mugenda, 2003).The study also employed a cross-sectional approach to obtain qualitative and quantitative data from the respondents. Choice of the approach was guided by the fact that it is relatively efficient and effective because of its nature of self-reporting of issues related to opinions, attitudes, and perceptions of respondents (Kombo & Tromp, 2007).

3.3 Target Population

The target population was household heads of the community WASH projects and the selected key informants from the same locality. Rhonda slum has a total of 8124 households (GoK, 2010). The estimated number of households served by the WASH projects is 296 (Practical Action &Umande Trust, 2012). Therefore the study targeted a population of 296 household who formed the cross section of people who have been involved in such projects. The respondents were reached through household survey and purposive identification of the key informants from across relevant local institutions. The study area was chosen because of the many WASH initiatives were undertaken by different agencies.

3.4 Sample Size and Sampling Procedure

According to Mugenda and Mugenda (2003), descriptive research design with a population less than ten thousand requires a representative sample of 10-30%. Out of a population of 296, the study considered only 89 household who formed the sample size. A sample from the household was picked for this study since a household acted as an appropriate unit providing reliable information relating to the study objectives. The three most important factors determining the size of an adequate sample include; Nature of the population; Investigation type and lastly degree of precision.

The sampling technique involved cluster sampling. This procedure was used where the study area was divided into two administrative groups namely Rhonda A and Rhonda B from plots that have been actively involved in WASH activities. The procedure was employed where the settlements were not evenly distributed but exist in clusters households near the project sites. At the start, simple random sampling was applied to the clusters to pick the first household for delivery of the questionnaires randomly. Once the first household was identified from the cluster, systematic sampling procedure was used to collect data through questionnaires in the proceeding households within the cluster. The systematic procedure was applied continuously where the settlements existed in some linear order

Cluster sampling was chosen because the individual units in the sample were physically together in groups as opposed to being scattered all over in the area. The technique also does not require sampling frame for all the population making it simple. Lastly, it takes into account larger populations as depicted by the study (Kerry & Bland, 1998). The advantage of choosing systematic sample was because it checked on issues of biases in the proceeding selections, it has a

small variance compared to other methods, it provides an additional degree of systems into randomization of subjects. Lastly, it provides an assurance that the sampling of population was evenly conducted.

Non-probability sampling technique for the study was purposive sampling. It was used in collecting qualitative data particularly those which involved key informants on specific themes. Purposive sampling procedure which depends on the researcher's judgment on the elements was used in identifying key informants for conducting interviews from various sectors. The reason for selecting purposive sampling for the informants was that they had a specific knowledge type and skills required for the study. Purposive sampling applies to methods of data collection involving either qualitative or quantitative whereby statistical analyses like regression models are used.

3.5 Research Instruments

The study adopted the use of questionnaires and key informant interviews to acquire primary data. Questionnaires were used to obtain data from the households that benefit from the WASH projects. Adoption of questionnaires minimized the researchers' biasedness emanating from personal issues during interview. Questions in the questionnaire were organized along the objectives of the study.

An interview schedule was formed to obtain data from the respondents who had deeper understanding of factors influencing sustainability of WASH interventions within the slum. The interview guide was structured based on the study objectives. Document analysis was used to obtain secondary data.

3.5.1 Piloting & Testing of Research Instruments

Before administering research tools to the participants, pre-testing of the instrument was undertaken in the nearby Kaptembwo slum which had similar characteristics. The study did pilot test a total of nine (9) households in line with the authority of Mugenda and Mugenda (2003), who propose a tenth of the sample to be taken. Questionnaires were administered to the section of the community to ensure the questions were relevant. The pre-testing aimed at establishing reliability and validity of the research tools ranging from the structure, wording, and sequence of the questions.

3.5.2 Validity of Research Instrument

The researcher developed a good rapport in the interview settings. To ensure validity, data triangulation was employed by collecting from varied sources. Also, instruments validity was established through a pilot study that provided instructions were clear and relevant. As a way of ascertaining content validity, all the possible responses were captured to provide adequate coverage of the survey. Determining content validity of a measure involved an expert from the WASH field (Mugenda &Mugenda,2003). To ascertain the validity of the research instruments, the researcher, therefore, consulted with experts including the investigator's supervisor and lecturers whereby the content of qualitative data was discussed before making conclusions and generalization to refine the research instruments. The results were analyzed for relevance concerning content, criteria, and construct of the instrument.

3.5.3 Reliability of Research Instrument

A pilot study was carried out in the neighboring slum of Kaptembwo. The area was chosen since it had similar characteristics. To assess reliability, the researcher used Cronbach's Alpha formula. A pilot group of 9 respondents in Kaptembwo location were targeted. A coefficient of 0.65 was obtained. A coefficient of 0.6-0.7 indicates acceptable reliability (Mugenda, 2008). Also, triangulation was used where one question was asked in alternative ways with the aim of achieving the same answer. The analysis was done for consistency and accuracy thus indicated the reliability of the instruments.

3.6 Data Collection Methods and Procedures

The study adopted primary and secondary data collection methods. Structured questionnaires together with the main informant interviews were employed to collect primary data. Questionnaires comprised open and close ended questions touching on the objectives of the study. An interview guide with open-ended questions was used to generate information on the main areas of stakeholders' participation. Also, secondary data were collected by reviewing the existing documents and reports relevant to the WASH projects in Nakuru. The materials included evaluation reports, project design documents, strategic plan and others from different government and non-government departments. The purpose of the review was guided by the four study objectives

3.7 Data analysis techniques and presentation

Descriptive data analysis that involves frequency distribution and percentages was employed on quantitative data. Analysis of data involved application of computer software known as Statistical Program for Social Sciences (SPSS V.20.0). Analysis of qualitative data was used to back up interpretation of quantitative data. To appropriately analyze qualitative interviews, Bogner et al. (2009:35) contend that focus should be made on thematic units, similar topics as presented by different interviewees. On this regard, therefore, triangulation formed the basis of analysis whereby both qualitative and quantitative data were presented in table format, percentages and measures of central tendencies. Inferential statistics were also considered where correlation and regression were applied to establish a relationship and their magnitude between dependent and independent variables. The use of regression model was appropriate because of its ability to test the nature of influence between independent variables and dependent variable. The method was appropriate since it can give the coefficient of the linear equation which contains more than one independent variables which are impossible with the correlation analysis. Cross tabulation was employed in data analysis by use of a regression model targeting significance level of every variable, and how influenced WASH projects sustainability as shown below

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \varepsilon$$

Where: Y = Sustainability of WASH projects; $\beta 0$ = Constant Term; $\beta 1$, $\beta 2$, $\beta 3$ and $\beta 4$ = Beta coefficients; X1= Community Participation; X2= Project Management Skills; X3= Funding; X4 = Technology and ε = Error term

3.8 Ethical Considerations

The researcher sought permission of conducting research in the study area from the relevant authority like Ministry of Higher Education, Science and Technology's National Council for Science and Technology. The letter from the authority was attached to the proposal to any action of data collection from the field. The study ensured confidentiality of the information shared by the respondents which were anonymous in nature. The study also provided proper referencing which aimed at acknowledging other person's work. The researcher ensured care was taken and all the steps followed not taking advantage of respondents weaknesses while undertaking research, for example not taking into consideration the time and location of the interviews. Lastly, sharing of the information obtained was based on the consent of the respondents.

3.9 Operational Definition of Variables

The table below specifies exactly how the concepts were measured. It contains procedures and operations necessary to measure the four variables of the study. Operationalization of variables was done based on indicators and other properties denoted by the concepts.

Table 3.1: Operational Definition of Variables

Variable	Type of Variable	Indicators	Means of Measuring	Measuring Scale	Data collection Tools	Data Analysis
Community participation	Independent	-Level of involvement in project decision making -Level of representation and responsibility -Level of contribution	-Labor inputs -Material inputs -Meetings attended -Feedback reports -Financial inputs	Nominal & Ordinal	Questionnaire Document analysis	Descriptive & Inferential
Project management skills	Independent	-Technical expertise -Resource management skills -Availability and effectiveness of management committee	-Type of training -Quality of work output	Nominal & Ordinal	Questionnaire Document analysis	Descriptive & Inferential
Funding	Independent	-Sources of funding -Total investment cost -Level of funding	-Budget reports -M&E reports	Nominal & Ordinal	Questionnaire Document analysis	Descriptive & Inferential

Technology	Independent	-Type of technology -Choice of the design -Maintenance and operation capacity	-Efficiency and -Effectiveness of technology	Nominal & Ordinal	Questionnaire Document analysis	Descriptive & Inferential
Sustainability of WASH projects	Dependent	-Capacities of people strengthened -Continued Improvement of the project -Environmental Protection and conservation -Improved health	-Dimension of success	Nominal & Ordinal	Questionnaire Document analysis	Descriptive & Inferential

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter focused on the study findings which have been analyzed and presented based on thematic areas guided by the four objectives. The subsections discussed include questionnaire return rate obtained from the study, demographic characteristics of the respondents, Community Participation and sustainability of WASH projects, Project management skills and sustainability of WASH projects, funding and sustainability of WASH projects and finally technology and sustainability of WASH projects

4.2 Questionnaire Return Rate

This section shows the questionnaire return rate for various respondents targeted during the study. Data was obtained by administering questionnaires to the household heads. A total of 89 questionnaires were delivered to the respondents out of which 85 responses were received giving a response rate of 95.5%. The study did not achieve 100% response rate since a few questionnaires were half way filled by the respondents. The return rate was relatively high because the questionnaires were self-administered by the researcher who ensured the respondents understood the research topic before answering the questions. The questionnaires were administered and collected on the same date by the researcher.

4.3Demographic characteristics of respondents

This section gives data on demographic characteristics of respondents who were interviewed. A few elements considered included gender, marital status, age, the level of education, the length of time stayed in the area, head of household and finally occupation. This gave a deeper knowledge in understanding how the study variables are related.

4.31Distribution of respondents by gender

The respondents were questioned based on their gender. The researcher sought to establish whether they were males or females as it was relevant in providing knowledge on the section of respondents who were household heads about sustainability of the WASH projects which is attached to gender regarding policy formulation. The result was as shown in Table 4.1

Table 4.1: Distribution of respondents by gender

Gender	Frequency	Percentage
Male	38	44.7
Female	47	55.3
Total	**85**	**100**

There were 38 (44.7%) male respondents and 47 (55.3%) female respondents. This shows that both genders were represented in the study, however not in equal proportion. Many female respondents can be attributed to the lifestyle of performing house chores during the time of the study. Therefore, majority of men either went out to look for daily bread.

4.32Distribution of respondents by Marital Status

The study sought to find out the marital status of the interviewees. The findings are presented in Table 4.2 below

Table 4.2: Distribution of respondents by Marital Status

Responses	Frequency	Percentage
Single	25	29.4
Married	57	67.1
Divorced	3	3.5
Total	**85**	**100**

The findings in Table 4.2 shows that majority of the interviewees (67.1%) were married, while the remaining (29.4%) and (3.5%) were single and divorced respectively. This suggests that there were significantly more household heads with families who were involved in WASH activities.

4.3.3 Distribution of respondents by Age

The study sought information on age of the interviewees and made the findings in Table 4.3 as shown below

Table 4.3: Distribution of respondents by Age

Responses	Frequency	Percentage
18-30	17	20.0
31-40	59	69.4
41-55	7	8.2
Above 55	2	2.4
Total	**85**	**100**

The findings in Table 4.3 shows that majority of the respondents 59(69.4%) were aged between 31 and 40 years old. It, therefore, implies that respondents in the study were of middle-aged.

4.3.4 Distribution of respondents by Level of Education

The study sought to find out the level of education of the respondents and made the findings in Table 4.4 as shown below

Table 4.4: Distribution of respondents by Level of Education

Responses	Frequency	Percentage
No schooling	4	4.7
Primary school	21	24.7
Secondary School	46	54.1
Tertiary	14	16.5
University	0	0
Total	**85**	**100**

The findings in Table 4.4 shows that majority of the respondents 46 (54.1%) had reached secondary level of education, followed by 21 (24.7%) who had acquired primary education. Only 4(4.5%) of the respondents had no education background with another 14 (16.5%) had reached the tertiary level. None had attained the university level of education .This indicates that the literacy level is average in Rhonda slums

4.3.5 Distribution of respondents by Period of stay

The study sought to find out the period of stay of the respondents and made the findings in Table 4.5 as shown below

Table 4.5: Distribution of respondents by Period of Stay

Responses	Frequency	Percentage
0-3 Months	3	3.5
1-3 Years	11	12.9
3-5 Years	19	22.4
More than 5 Years	52	61.2
Total	**85**	**100**

The findings in Table 4.5 shows the period of stay of the respondents in Rhonda slums. 3(3.5%) had stayed for less than a year, 11(12.9%) between 1-3 years, 19 (22.4%) between 3-5 years and 52 (61.2%) for over a five-year period. This indicates that the findings of the study are based on opinions obtained from the real inhabitants of Rhonda slums

4.3.6 Distribution of respondents by Occupation

The study sought to find out the distribution of respondents based on occupation. The findings are presented in Table 4.6 as shown below

Table 4.6: Distribution of respondents by Occupation

Responses	Frequency	Percentage
Farmer	17	20.0
Teacher	9	10.6
Self employed/ Own business	46	54.1
Social Worker	10	11.8
Other	3	3.5
Total	**85**	**100**

According to Table 4.6, out of the 85 respondents, 46 (54.1%) indicated that they run their own business, 17 (20%) are farmers, 10 (11.8%) are social workers, 9 (10.6%) are teachers and 3 (3.5%) indicated other occupation. This suggests that due to the limited level of education within the slums, most of the people do not have high profile jobs which can generate some reasonable level of income.

4.4 Influence of Community Participation on WASH Projects sustainability

The study sought to understand how community participation influences sustainability of WASH projects. The findings are presented in the tables that follow.

4.4.1 Decision on Water and Sanitation issues between genders

The study sought to find information from the respondents in regards to decision making on water and sanitation issues. The findings were presented in Table 4.7

Table 4.7: Decision on Water and Sanitation issues between genders

Responses	Frequency	Percentage
Men	23	27.1
Women	62	72.9
Total	**85**	**100**

The findings in Table 4.7 shows that majority of the respondents 62(72.9%) indicated that women dominated decision making as compared to 23 (27.1%) of the respondents who reported men taking part in decision making. It suggests the fact that females are sensitive on matters of hygiene at the household levels.

4.4.2 Decision on selection of construction site

The study sought to find out the opinion of the respondents on decision making during the selection of construction site. Below were the findings.

Table 4.8: Decision on selection of construction site

Responses	Frequency	Percentage
Community leaders	63	74.1
Women groups	4	4.7
WASH Management committee	12	14.1
Community members	5	5.9
Other	1	1.2
Total	**85**	**100**

Table 4.8 shows findings of who made decisions on selection of construction site for WASH facilities, 63 (74.1%) agreed decision was made by community leaders, 4 (4.7%) by women groups, 12(14.1%) by WASH management committee, 5(5.9%) by community members and 1(1.2%) by other parties. This indicates that decision at the community level within Rhonda slum is made by leaders who play a vital role in the development of WASH projects. Representation of the community is proper which significantly enhances participation.

4.4.3 Roles played by the community in project implementation

The study sought to find out the opinion of the respondents on roles played by the community in project implementation. Below were the findings.

Table 4.9: Roles played by the community in project implementation

Responses	Frequency	Percentage
Provision of locally available materials	28	32.9
Financial contribution	1	1.2
Provision of communal land	53	62.4
Other	3	3.5
Total	**85**	**100**

Table 4.9 shows the roles community members play in project implementation. The majority of the respondents 53(62.4%) indicated that the community provided land, 28(32.9%) provided materials, 1(1.2%) contributed financially and 3(3.5%) stated that the community offered other things for the project. This reveals that there is community participation in Rhonda slum; land is a resource resident set aside for the development of projects.

4.4.4 Extent of Community participation in the planning and implementation of projects

The study sought to find out the opinion of the respondents on roles played by the community in project implementation. Findings were presented in Table 4.10

Table 4.10: Extent of Community participation in the planning and implementation of projects

Responses	Frequency	Percentage
Great extent	30	35.3
Moderate extent	34	40.0
Neutral	6	7.1
Small extent	8	9.4
No extent	7	8.2
Total	**85**	**100**

Table 4.10 shows that 34 (40.0%) of the respondents believed that community participated in the planning and implementation of the projects to a moderate extent. An additional 30 (35.3%) to a great extent. This gives a total of 75.3% of the respondents who reported that there was community participation during planning and implementation of the projects. This shows that community participation has a significant impact on planning and implementation of WASH projects in Rhonda slums.

4.4.5 Influence of Community participation on sustainability of WASH Projects

The study sought to find out the opinion of the respondents on whether community participation influences sustainability of the projects. Their views were as shown in Table 4.11

Table 4.11: Influence of Community participation on sustainability of WASH Projects

Responses	Frequency	Percentage
Great extent	36	42.4
Moderate extent	31	36.5
Neutral	12	14.1
Small extent	5	5.8
No extent	1	1.2
Total	**85**	**100**

Table 4.11 shows that 36 (42.4%) of the respondents believed that community participation influences sustainability of projects to a great extent. An additional 31(36.5%) to a moderate extent. This gives a total of 78.9% of the respondents who reported that community participation has an influence on project sustainability. This shows that active involvement by the community is likely to lead to project success.

4.4.6 Opinions on projects initiated in the community but later failed

The study sought information on a few project started but later failed and compiled respondents views as shown in Table 4.12

Table 4.12: Opinions on projects initiated in the community but later failed

Responses	Frequency	Percentage
Yes	39	45.9
No	46	54.1
Total	**85**	**100**

Table 4.12 illustrates respondents view on projects initiated in the community but later failed, 39(45.9%) agreed on the presence of a few projects which failed while 46 (54.1%) were on the contrary of projects fail. Those who believed some projects had failed attributed to the fact that there was poor management of the facilities by the people concerned and inadequate training on operation and maintenance of the new technology.

4.4.7 Importance of Community participation

The respondents were asked to indicate whether community participation was essential for the sustainability of the WASH projects. Their views were presented as shown in Table 4.13

Table 4.13: Importance of Community participation

Responses	Frequency	Percentage
Yes	82	96.5
No	3	3.5
Total	**85**	**100**

Table 4.13 shows that majority of the respondents 82 (96.5%) responded affirmatively while 3 (3.5%) disagreed with the fact that community participation was necessary. The minority attributed sustainability of the projects with proper funding by the donor. Implication of the results was that community participation is an important factor in ensuring sustainability of projects notwithstanding other factors

4.4.8 Extent to which Community participation is important

The study sought to find out the extent to which community participation was critical from the respondents who agreed. Findings were presented in Table 4.14

Table 4.14: Extent to which Community participation is important

Responses	Frequency	Percentage
Great extent	36	43.9
Moderate extent	31	37.8
Neutral	5	6.1
Small extent	6	7.3
No extent	4	4.9
Total	**82**	**100**

The findings in Table 4.14 shows that 36 (43.9%) of the respondents considered community participation as necessary to a great extent, 31 (37.8%) to a moderate degree, 5 (6.1%) were neutral, 6 (7.3%) to a small extent and finally 4 (4.9%) to no extent at all. It implies the community is enlightened about the importance of their engagement in identifying and resolving matters that affect them which are geared towards sustainable development.

4.4.9 Suggestion on what can be done on Community participation to enhance sustainability

The study sought information on action to be taken on community participation to improve the sustainability of the projects. Below were the findings

Table 4.15: Suggestion on what can be done on Community participation to enhance sustainability

Responses	Frequency	Percentage
Sensitization and group formation	14	16.5
Operation and maintenance training	7	8.2
Monitoring and guidance	2	2.4
No response	62	72.9
Total	**85**	**100**

The findings in Table 4.15 show that 14 (16.5%) of the respondents suggested the need for community sensitization and formation of groups to ensure social cohesion, 7(8.2%) suggested need for training in operation and maintenance of the facility, an additional 2 (2.4%) respondents indicated need for monitoring and guidance of by community while majority 62 (72.9%) did not respond to the question. It, therefore, implies that most people in Rhonda do not have a quick solution to their problems.

4.5 Influence of Project Management Skills on WASH Projects sustainability

4.5.1 Identification of WASH facilities

The study sought to find information from the respondents in regards to WASH facilities they are aware. Below were the findings.

Table 4.16: Identification of WASH facilities

Responses	Frequency	Percentage
Biocenter	35	41.2
Toilets/Pit latrines	14	16.5
Washing facilities	11	12.9
Water points	25	29.4
Total	**85**	**100**

The findings in Table 4.16 indicate that majority of the respondents 35(41.2%) are aware of the Biocentre in the region, 14(16.5%) talked about existence of toilets and pit latrines which are plot based, 11(12.9%) Washing facilities and another 25(29.4%) indicated water points. It implies that the level of awareness of sanitation facilities in Rhonda is fairly good.

4.5.2 Management of WASH facilities

The study sought to find responses on who manages the facilities. The results were presented in Table 4.17.

Table 4.17: Management of WASH facilities

Responses	Frequency	Percentage
Community leaders	16	18.8
Women groups	5	5.9
WASH Management committee	60	70.6
Other	4	4.7
Total	**85**	**100**

The findings in Table 4.17 show that majority of the respondents 60(70.6%) alluded to the fact that management of the facility is carried out by WASH management committee, 16 (18.8%) by community leaders, 5(5.9%) by women groups while the rest 4(4.7%) gave other parties who are responsible for management. This shows some aspect of leadership which is well organized and charged with the responsibility of managing public resources in Rhonda.

4.5.3 Challenges on the use of WASH facilities

The study sought information on the problems which commonly arise from the utilization of the services. The results were presented in Table 4.18 below.

Table 4.18: Challenges on the use of WASH facilities

Responses	Frequency	Percentage
Water rationing	16	18.8
Vandalism	6	7.1
High maintenance cost	47	55.3
Frequent breakdown	13	15.3
Other	3	3.5
Total	**85**	**100**

The findings in Table 4.18 confirms that majority of the respondents 47(55.3%) indicated high maintenance cost of the WASH facilities as the major challenge, 16 (18.8%) talked of water rationing, 6(7.1%) lack of education and training, 13 (15.3%) frequent breakdowns while the rest 3(3.5%) mentioned other challenges. It, therefore, implies that proper costing should be established to achieve sustainability

4.5.4 Response to Challenges

The study enquired on whether those who are charged with management respond adequately to the challenges whenever raised. The results were presented in Table 4.19 below.

Table 4.19: Response to Challenges

Responses	Frequency	Percentage
Yes	23	27.1
No	62	72.9
Total	**85**	**100**

As shown in Table 4.19, majority 62(72.9%) of the respondents indicated that those who are charged with managing the facilities do not respond adequately to the challenges while 23 (27.1%) agreed there was adequate response towards the problems. This shows that the level of response to the issues is still weak in WASH projects.

4.5.5 Response on work effectiveness

The study enquired on whether those who are charged with management are useful in their work. The results were presented in Table 4.20

Table 4.20: Response on work effectiveness

Responses	Frequency	Percentage
Yes	16	18.8
No	59	69.4
Not sure	10	11.8
Total	**85**	**100**

As shown in Table 4.20, majority 59 (69.4%) of the respondents indicated that those who are charged with managing the facilities are not effective in their work, 16 (18.8%) agreed that they were effective while the rest 10 (11.8%) of the respondents were not sure. The implication of the results was that management is weak.

4.5.6 Management Skills and sustainability of WASH projects

The study sought to ascertain the influence of project management skills on the sustainability of WASH projects. Respondents were asked to indicate their level of concurrence. The rating was done on a five-point Likert scale where: 1- Strongly Disagree, 2- Disagree, 3-Neutral, 4- Agree, 5- Strongly Agree. The mean and standard deviations were generated from SPSS and presented as follows in Table 4.21

Table 4.21 Management Skills and sustainability of WASH projects

Statements	Mean
There is sufficient technical expertise to manage the project	3.59
There is enough resource management skills for sustainability of the project	3.69
The community is satisfied with the management offered by the WASH project committee	3.77
Project managers have adequate experience in management	3.65
Technical advice about the architecture was made available for the project	4.03
Management has increased the alignment of development projects with the community needs	3.79
WASH Projects are complex and require multifaceted management skills	3.91
Leadership skills of managers are satisfactory	3.62
Risk management is satisfactory	3.82
There are clear and achievable estimates in the project budget and schedule	3.89

The findings show that majority of the respondents agreed that there was technical advice about the architecture for the project (M=4.03), WASH Projects are complex and require multifaceted management skills (M=3.91), There were clear and achievable estimates in the project budget and schedule (M=3.89), Risk management is satisfactory (M=3.82), Management has increased the alignment of development projects with the community needs (M=3.79), The community is satisfied with the management offered by the WASH project committee (M=3.77), There is enough resource management skills for sustainability of the project (M=3.69), Project managers have adequate experience in management (M=3.65), Leadership skills of managers are satisfactory (M=3.62) and that there is sufficient technical expertise to manage the project (M=3.59) respectively.

4.6 Influence of Funding on WASH Projects sustainability

4.61 Source of finance

The study sought information on the financial source for the project. The results were as shown in Table 4.22

Table 4.22 Source of finance

Responses	Frequency	Percentage
Own finance	5	5.8
Loan	31	36.5
Savings	2	2.4
Donor	44	51.8
Other	3	3.5
Total	**85**	**100**

As shown in Table 4.22, majority 44 (51.8%) of the respondents said their financial source was from Donor, 31 (36.5%) of the respondents received loans, 5(5.8%) used their finances, 3(3.5%) obtained funding from other sources while the remaining 2(2.4%) of the respondents used their savings. This shows that donor agencies play a significant role in WASH projects in Rhonda slums.

4.62 Amount received from the financing partner

The study aimed at knowing how much money the funding partner contributed. The results were as shown in Table 4.23 below

Table 4.23 Amount received from the financing partner

Responses	Frequency	Percentage
BELOW KSH.50,000	1	1.2
KSH 50,000-100,000	9	10.6
KSH 100,000-150,000	12	14.1
KSH 150,000-300,000	22	25.9
ABOVE KSH. 300,000	41	48.2
Total	**85**	**100**

The findings in Table 4.23 shows that majority 41(48.2%) received an amount greater than Ksh.300, 000, while only 1(1.2%) of the respondents received money below Ksh.50, 000. These results show the substantial investment taken to the WASH projects

4.63 Project total investment cost

The study sought to find out the total investment cost for the project and came up with the following results presented in Table 4.24 below

Table 4.24 Project total investment cost

Responses	Frequency	Percentage
BELOW KSH.50,000	6	7.1
KSH 50,000-100,000	12	14.1
KSH 100,000-150,000	14	16.5
ABOVE KSH. 150,000	21	24.7
Not sure	32	37.6
Total	**85**	**100**

The findings in Table 4.24 shows that majority 32(37.6%) were not sure of the total investment cost, 21(24.7%) of the respondents indicated above Ksh.150000, 14(16.5%) between Ksh.100000-150000, 12 (14.1%) between Ksh 50000-100000 while the rest 6 (7.1%) below Ksh.50000 respectively. It shows that many residents were not aware of the total money spent on the projects

4.64 Funds Sufficiency

The study sought to find out opinion on funds sufficiency for maintenance and improvement of the facilities. Results were presented in Table 4.25

Table 4.25 Funds Sufficiency

Responses	Frequency	Percentage
Yes	9	10.6
No	20	23.5
Not sure	56	65.9
Total	**85**	**100**

The findings in Table 4.25 shows that majority 56 (65.9%) of the respondents were not sure of funds sufficiency, 20(23.5%) indicated that the funds were not sufficient while the rest 9(10.6%) said the funds were sufficient. It clearly shows lack of awareness on financial usage.

4.65 Effectiveness of Funding Policies

The study sought to find out the effectiveness of funding policies enhancing project sustainability. The results were as presented in Table 4.26

Table 4.26 Effectiveness of Funding Policies

Funding Policy	1	2	3	4	5	Mean	Std. Deviation
Timely disbursement of funds	0(0%)	19(22.4%)	17(20%)	37(43.5%)	12(14.1%)	3.84	0.17
Donor Planning timeline	0(0%)	0(0%)	14(16.5%)	47(55.3%)	24(28.2%)	3.82	0.23
Financial systems	0(0%)	2(2.4%)	11(12.9%)	57(67.1%)	15(17.6%)	3.80	0.31
Internal audit	0(0%)	0(0%)	4(4.7%)	70(82.4%)	11(12.9%)	3.93	0.26
Budget policies	0(0%)	2(2.4%)	5(5.9%)	67(78.8%)	11(12.9%)	4.2	0.27

The findings in Table 4.26 show that the respondents with a mean of 4.20 indicated that the budget policies are very effective, Results further show an average of 3.93 that internal audits are effective. They also reported with a mean of 3.84 that timely disbursements of funds were effective. An average of 3.82 shows that donor planning timeline was effective and lastly an average of 3.80 indicates that financial systems be useful. This suggests that the existing financial systems play a significant role in the sustainability of WASH projects. The literature review did

not establish any study that was touching on the effects of economic systems and sustainability of WASH projects hence this study filled this gap.

4.66 Income generation

The study sought to find out whether the project generates some revenue through water sales and other activities. The results were as presented in Table 4.27

Table 4.27 Income generation

Responses	Frequency	Percentage
Yes	65	76.5
No	20	23.5
Total	**85**	**100**

The findings show that 65 (76.5%) of the respondents agreed to the fact that some income is generated through water sales while the rest 20 (23.5%) indicated that no such income is received. This shows that there is some revenue collected from the projects.

4.67 Revenue collection

The study sought information on the people charged with the responsibility of raising revenue. The results were as presented in Table 4.28

Table 4.28 Revenue collection

Responses	Frequency	Percentage
Treasurer	58	68.2
Secretary	12	14.1
Chairperson	14	16.5
Other	1	1.2
Total	**85**	**100**

According to the findings, 58(68.2%) of the respondents said revenue is collected by the treasurer, 14 (16.5%) by the chairperson, 12 (14.1%) by the secretary while only 1 (1.2%) indicated others.

It, therefore, shows that there is some form of leadership and organization when it comes to revenue collection.

4.68 Bank account ownership

The study sought information on the property of any bank account by the beneficiaries. The results were as presented in Table 4.29

Table 4.29 Bank account ownership

Responses	Frequency	Percentage
Yes	70	82.4
No	15	17.6
Total	**85**	**100**

The findings in Table 4.29 confirms that majority of the respondents 70(82.4%) agreed on account ownership while only 15 (17.6%) were not aware of any account. It shows that there is still some money generated which is not accounted for.

4.69 Access to financial records

Regarding the accessibility of financial records, the results were as presented in Table 4.30

Table 4.30 Access to financial records

Responses	Frequency	Percentage
Yes	3	3.5
No	82	96.5
Total	**85**	**100**

The findings in Table 4.30 asserts that majority 82 (96.5%) of the respondents do not have access to financial records while only 3 (3.5%) could access the records. This shows low level of transparency on financial matters

4.610 Influence of funding on project sustainability

The study sought information on whether funding influence sustainability of the project; the results were as presented in Table 4.31

Table 4.31 Influence of funding on project sustainability

Responses	Frequency	Percentage
Yes	77	90.6
No	8	9.4
Total	**85**	**100**

The findings in Table 4.31 confirms that majority 77 (90.6%) of the respondents agreed to the fact that funding influence project sustainability while the rest 8 (9.4%) of the respondents declined. This shows that funding is a significant factor to be put into consideration when addressing sustainability of the project.

4.611 Extent to which funding influence sustainability of the project

The study sought information on whether funding influence sustainability of the project; the results were as presented in Table 4.32

Table 4.32 Extent to which funding influence sustainability of the project

Responses	Frequency	Percentage
Strongly agree	32	37.6
Agree	35	41.2
Neutral	11	12.9
Disagree	6	7.1
Strongly disagree	1	1.2
Total	**85**	**100**

The findings in Table 4.32 show that majority 35 (41.2%) agreed to the fact that funding influence sustainability of the project, 32 (37.6%) Strongly agreed, 11 (12.9%) were undecided, 6(7.1%)

disagreed while only 1(1.2%) strongly disagreed. It, therefore, shows that funding influence project sustainability to a moderate extent

4.612 Effects of inadequate funds on Project sustainability

Concerning the effects of scarce resources on project sustainability, the respondents asserted that there is a weak accountability mechanism; it also leads to incompletion of the project and deprivation of long-term benefits. Finally, they also confirmed that planning becomes a challenge in the execution of various activities.

4.613 Continuity of projects after withdrawal of funds

The study sought information as to whether projects continue well even after funding is withdrawn by promoters. The results were as presented in Table 4.33

Table 4.33 Continuity of projects after withdrawal of funds

Responses	Frequency	Percentage
Yes	13	15.3
No	68	80.0
Not Sure	4	4.7
Total	**85**	**100**

According to the findings of the study in Table 4.33, majority 68 (80.0%) of the respondents indicated that projects do not continue well after funds withdrawal, 13 (15.3%) agreed that projects continue well while the rest 4(4.7%) were not sure. This shows that most projects were not self- sustaining after funds withdrawal hence the need to design a mechanism to address sustainability issues.

4.7 Influence of Technology on WASH Projects sustainability

4.71 Technology used to dispose human waste

Respondents were asked to indicate the type of technology used to dispose of human waste. The results were as presented in Table 4.34

Table 4.34 Technology used to dispose human waste

Responses	Frequency	Percentage
Pour flush connected to a soak pit	4	4.7
Pour flush connected to a septic tank	6	7.1
Pour flush connected to a sewer connection	13	15.3
Pit latrine	61	71.7
VIP latrine	1	1.2
Other	0	0
Total	**85**	**100**

From the results of the study in Table 4.34, majority of the respondents 61(71.7%) used pit latrines, 13(15.3%) used pour flush connected to a sewer, 6(7.1%) used pour flush connected to a septic tank and 4 (4.7%) used pour flush connected to a soak pit. It shows that the level of adoption of the new technology in the management of WASH projects is still very low hindering projects sustainability

4.72 Choice of the design

The study sought information on how the design was chosen. Results were as shown in Table 4.35

Table 4.35 Choice of the design

Responses	Frequency	Percentage
Advice from NAWASSCO	39	45.9
Advice from MoH	30	35.3
Advice from project promoters	2	2.4
Self Knowledge	11	12.9
Not sure	3	3.5
Total	**85**	**100**

From the results of the study in Table 4.35, majority of the respondents 39(45.9%) got advice from NAWASSCO, 30(35.3%) from MoH, 11(12.9%) had self-knowledge of the design, 3(3.5%) were not sure while only 2(2.4%) from project promoters. It was a clear indication of the role played by government in collaboration with other stakeholders on matters of sanitation within the slum to ensure sustainability.

4.73 Level of operation and maintenance of the facility

The study sought information on the rate regarding level of transactions and maintenance of the facilities. The results were as presented in Table 4.36

Table 4.36 Level of operation and maintenance of the facility

Responses	Frequency	Percentage
Very good	0	0.0
Good	0	0.0
Neutral	11	12.9
Bad	72	84.7
Very bad	2	2.4
Total	**85**	**100**

From the results of the study in Table 4.36, the majority of the respondents 72 (84.7%) indicated bad, 11(12.9%) were not sure while only 2 (2.4%) showed very bad. This shows that the general condition of the facilities is poor.

4.74 Appropriateness of technology

The study sought information on whether the current technology used is appropriate. Results were as shown in Table 4.37

Table 4.37 Appropriateness of technology

Responses	Frequency	Percentage
Yes	0	0.0
No	78	91.8
Not sure	7	8.2
Total	**85**	**100**

From the results of the study in Table 4.37, the majority of the respondents 78 (91.8%) indicated that the technology used is not appropriate while 7 (8.2%) were not sure. It shows that there is need to enhance existing technology to ensure sustainability.

4.75 Reasons why technology used is not appropriate

Respondents were to give further reasons why the technology used was not appropriate. They indicated that most of the users lack adequate knowledge on management, some do not conform to the cultural beliefs, and lastly, it was imposed on people

4.76 Influence of technology on projects sustainability

Respondents were asked to indicate whether technology influences sustainability of their projects. Results were as shown in Table 4.38

Table 4.38 Influence of technology on projects sustainability

Responses	Frequency	Percentage
Yes	83	97.6
No	2	2.4
Total	**85**	**100**

Results from Table 4.38 showed that 83(97.6%) of the respondents agreed to the fact that technology influences sustainability of their projects with only 2(2.4%) said no. It is a clear indication that very little has been achieved in ensuring proper technology is adopted in slum projects

4.77 Community involvement in deciding choice of technology

The study sought information whether the community was involved in determining choice of technology. Results were as presented in Table 4.39

Table 4.39 Community involvement in deciding choice of technology

Responses	Frequency	Percentage
Yes	0	0.0
No	85	100.0
Total	**85**	**100**

Results from Table 4.39 show that none was involved in deciding the choice of technology used in the projects. It was an indication of negligence on the side of implementers

4.78 Reasons why the community was not involved

Respondents were to give further reasons why the community did not participate. They indicated that their leaders did not notify them; some said there was little time while others mentioned the fact that resources were limited

4.79 Things to be done to the current technology to enhance sustainability

The study sought the opinion of the respondents on the possible things to be done to improve project sustainability. They indicated that there should be top management support and proper training on the use of technology.

4.8 Sustainability of WASH projects

4.81 Capacity strength of the community

The study sought information on projects regarding strengthening capacities of the community. Results were presented in Table 4.40

Table 4.40 Capacity strength of the community

Responses	Frequency	Percentage
Very good	0	0.0
Good	4	4.7
Neutral	75	88.2
Bad	6	7.1
Very bad	0	0.0
Total	**85**	**100**

According to the findings in Table 4.40, majority 75 (88.2%) remained neutral on the issue of capacity strengthening showing that sustainability of projects is not yet met.

4.82 Improvement of WASH projects

The study tried to find out the growth of projects from the respondents. Results were presented in Table 4.41

Table 4.41 Improvement of WASH projects

Responses	Frequency	Percentage
Yes	42	49.4
No	43	50.6
Total	**85**	**100**

According to the findings in Table 4.41, respondents had divided opinions on the improvement of the projects with 43(50.6%) said No while 42 (49.4%) said Yes. It indicates that sustainability is an ongoing process.

4.83 Environmental protection and conservation of the project

Respondents were asked whether the project conserves the environment. Response was presented in Table 4.42

Table 4.42 Environmental protection and conservation of the project

Responses	Frequency	Percentage
Yes	15	17.6
No	70	82.4
Total	**85**	**100**

According to the findings in Table 4.42, majority of the respondents 70(82.4%) said there was no environmental protection while the remaining 15(17.6%) indicated that projects do ensure environmental protection and conservation. It, therefore, shows that environmental condition within the slum needs to be improved.

4.84 Improvement in health of the community

Respondents were asked whether health has improved since the existence of the project. Results were presented in Table 4.43

Table 4.43 Improvement in health of the community

Responses	Frequency	Percentage
Yes	22	25.9
No	63	74.1
Total	**85**	**100**

According to Table 4.43, majority 63(74.1%) said there was no health improvement while the rest 22(25.9%) agreed that health has improved since the project came. It, therefore, implies design of projects do not address matters of health entirely

4.85 Appropriate factor which influence sustainability of the facility

The study sought to find out what influences sustainability of the facility. Results were presented in Table 4.44

Table 4.44 Appropriate factor which influence sustainability of the facility

Responses	Frequency	Percentage
Community participation	32	37.6
Project Management Skills	8	9.4
Funding	5	5.9
Technology	40	47.1
Other	0	0.0
Total	**85**	**100**

According to Table 4.44, majority 40 (47.1%) indicated that technology was the primary factor influencing sustainability of the facility followed by community participation at 32 (37.6%). It, therefore, implies that project implementers need to engage the community and provide appropriate technology to ensure sustainability.

4.9 Correlation analysis

To establish the strength of relationship between the variables, the study adopted Karl Pearson's coefficient of correlation. Results were presented in Table 4.45

Table 4.45 Correlation analysis

	WASH projects Sustainability	Community Participation	Project Management Skills	Funding	Technology
WASH projects sustainability (r)	1.000				
(p) Sig. (2 tailed)					
Community participation (r)	0.671	1.000			
(p) Sig. (2 tailed)	0.022				
Project Management skills (r)	0.484	0.312	1.000		
(p) Sig. (2 tailed)	0.029	0.039			
Funding (r)	0.401	0.166	0.214	1.000	
(p) Sig. (2 tailed)	0.017	0.021	0.044		
Technology (r)	0.862	0.162	0.228	0.460	1.000
(p) Sig. (2 tailed)	0.042	0.031	0.0445	0.012	

According to Table 4.45, there is a positive relationship between WASH projects sustainability and community participation, Project management skills, Funding and Technology with a magnitude of 0.671, 0.484,0.401 and 0.862 respectively. The positive relationship denotes that there is a correlation between the factors influencing sustainability and sustainability of WASH

projects in Rhonda, Nakuru County, Kenya with technology having the highest value while funding the lowest correlation value

Nevertheless, all the factors had a significant p-value ($p< 0.05$) at 95% confidence level. The significance values for relationship between WASH projects sustainability and community participation, project management skills, Funding, and Technology were 0.022, 0.029, 0.017 and 0.042 respectively. This denotes that technology was the most significant factor followed by project management skills, community participation and lastly Funding.

4.10 Regression analysis

To establish regression coefficient of the relationship between WASH projects sustainability and four predictive variables. The study adopted regression model targeting significance level of every variable as shown by the equation below

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \varepsilon$$

Where: Y = Sustainability of WASH projects; $\beta 0$ = Constant Term; $\beta 1$, $\beta 2$, $\beta 3$ and $\beta 4$ = Beta coefficients; X1= Community Participation; X2= Project Management Skills; X3= Funding; X4 = Technology and ε = Error term

The results were presented in Table 4.46

Table 4.46 Regression analysis

Model	Unstandardized coefficients B	Std. Error	Standardized coefficients Beta	t	Sig
(Constant)	0.950	0.216		4.341	0.001
Community Participation	0.110	0.066	0.79	1.561	0.022
Project Management Skills	0.030	0.053	0.027	0.560	0.572
Funding	0.007	0.050	0.445	8.271	0.001
Technology	0.631	0.074	0.007	0.150	0.876

Table 4.46 shows that considering all factors, Community participation, project management skills, Funding, and Technology constant at zero sustainability of WASH projects will be 0.950. Results also showed that considering other independent variables at zero, a unit increase in community participation would lead to a 0.110, growth in project management skills would lead to 0.030, increase in funding would lead to 0.007 and increase in sensitizing the community on technology would lead to 0.631. Further, the findings indicate that at 5% level of significance and 95% confidence level, community participation stood at 0.022, project management skills at 0.572, Funding at 0.001 and lastly Technology at 0.876 hence the most significant factor technology.

As per the SPSS generated table above, the equation $Y = \beta0 + \beta1X1 + \beta2X2 + \beta3X3 + \beta4X4+ \varepsilon$

Becomes: $Y = 0.95+ 0.11X1 + 0.03X2 + 0.007X3 + 0.631X4$

The effect of standard error of estimate ε is assumed to be negligible ($\varepsilon=0$)

Looking overall, there was a positive and significant relationship between all the independent and dependent variables. Technology had the greatest effect on project sustainability followed by community participation, project management skills and lastly funding.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents summary of results based on the analysis of data, discussions, conclusion drawn from the study and finally recommendations. The section also outlines the contributions made to the body of knowledge.

5.2 Summary of Findings

A total of 89 questionnaires were delivered to the respondents out of which 85 responses were obtained giving a response rate of 95.5%. There were 38 (44.7%) male respondents and 47 (55.3%) female respondents interviewed during the study. The study found that Community participation was fundamental to sustainability of WASH projects as agreed by a combined 78.9% of the respondents surveyed who indicated both great and moderate extent. The analysis also revealed a significant positive correlation between community participation and sustainability of WASH projects ($r=0.671$, $p<0.05$). The correlation was of moderate strength and significant at 0.05 level. This implies that the high degree of sustainability of WASH projects was associated with greater community participation.

On the influence of management skills on sustainability, a mean of 3.69 was recorded since respondents said there were enough resource management skills for sustainability of the project. On community satisfaction on the management offered by the WASH project committee, a mean of 3.77 was recorded from the respondents. A Pearson's product correlation analysis showed that there was a significant positive relationship between project management skills and sustainability of WASH projects ($r= 0.484$, $p<0.05$). The correlation was statistically significant at the 0.05 level of significance, implying that WASH committee members who had proper management skills reflected higher level of project sustainability hence sustainability of WASH projects is associated with higher management skills.

Results also indicated that 90.6% of the respondents agreed to the fact that funding influence project sustainability. A Pearson’s product correlation analysis revealed that there was a significant positive relationship between funding and sustainability of WASH projects ($r= 0.401$,

$p<0.05$). The correlation was of moderate strength and significant at 0.05 level. This implies that the high level of sustainability of WASH projects was associated with moderate level of funding

Findings also revealed that at least 97.6% of the respondents agreed that technology influenced the sustainability of their WASH projects to a higher degree. The findings revealed that where respondents rated the choice of technology highly, WASH projects was equally rated to be more sustainable. A Pearson's product correlation analysis showed that there was a significant positive relationship between technology and sustainability of WASH projects ($r= 0.862$, $p<0.05$). The correlation was of greater strength and significant at 0.05 level. The majority of the respondents felt that the technology adopted would be appropriate in ensuring success of their projects. This implies that sustainability of WASH projects was associated with higher technological choice

Lastly, the study sought to measure the sustainability of WASH projects in Rhonda slums and made the following findings; With regards to capacity strengthening of the community, the study found that majority 75 (88.2%) remained neutral on issue of capacity enhancement showing that sustainability of projects is not yet met. On project improvement, respondents had divided opinions with 43(50.6%) said no increase while 42 (49.4%) agreed there was slight improvement. This shows that sustainability is an ongoing process. With regards to environmental protection and conservation, majority of the respondents 70(82.4%) said there was no environmental protection while the remaining 15(17.6%) indicated that projects do ensure environmental protection and conservation. It, therefore, shows that environmental condition within the slum needs to be improved. Lastly on health issues 63(74.1%) said there was no health improvement while the rest 22(25.9%) agreed that health has improved since the project came. It, therefore, implies design of projects do not address matters of health entirely

5.3 Discussion of Key Findings

The first objective was to establish how Community participation influence sustainability of water and sanitation projects. Analysis and interpretation of data indicated that community participation influence projects sustainability. There was a significant positive correlation between community participation and sustainability of WASH projects ($r=0.671$, $p<0.05$). The correlation was of moderate strength and significant at 0.05 level. This implies that the high degree of sustainability of WASH projects was associated with greater community participation.

From the findings, community members play a crucial role in decision- making towards the project, their contribution ranges from provision of land, locally available materials, security and financial support. These findings concur with Mushtaq (2004) where community participation is described as a process by which various individuals from all sects take control of decisions which affect their lives. It involves a collaboration of both men and women in decision-making, design, and implementation of the projects. Community participation is essential for any project implemented within a community. Beneficiaries should be involved in all stages of the project. In so doing, long term solutions can be realized that are compatible with their own needs.

The findings are also in agreement with the study conducted by Harvey and Reed (2007) indicating that community participation extends to decisions about the installation of WASH facilities, choice of technology and the management structure of the project. According to the study, the decision on the selection of the construction site involved various groups including village elders who provided support. The findings are in line with Chappel, (2005) who argued that by their support, community ensures project success through joint efforts to increase control over resources and relevant institutions

According to Oakley & Marsden (2007), community support ensures that they influence and share control over development initiatives. It is comparatively important that resources in slum based projects in Kenya are managed efficiently by reducing wastages and ensuring their sustainability. The findings were similar to that of Roseland et al. (2005) who argued that viability of projects entails community participation in a joint decision-making process that achieve dimensions of socio-cultural, environmental and economic needs. Sustainable community incorporates development of a local and self-sustaining economy that does not impair the social well-being of the communities

The second objective was to ascertain how Project Management skills influence the sustainability of water and sanitation projects. Analysis showed that there was a significant positive relationship between project management skills and sustainability of WASH projects ($r= 0.484$, $p<0.05$). The correlation was statistically significant at the 0.05 level of significance, implying that WASH committee members who had proper management skills reflected a higher standard of project sustainability hence sustainability of WASH projects is associated with more top management skills.The study established that those who managed the facilities were not sufficient enough and did not respond adequately to the challenges. The study also revealed that the technical expertise was not sufficient. However there was enough human resource to manage the project, the community was not satisfied with the overall management especially on the risk associated with the facilities.

The findings are in line with Weinberg (2008) who indicated that community-based projects are complex in nature and require different management skills. A project manager has to be equipped with both management related skills and technical skills to ensure sustainability of the projects. The study revealed that management has increased the alignment of development projects with the community needs and that leadership skills of managers are satisfactory compared to technical expertise to manage the project. It contends to the studies conducted by Kirsch (2000) who indicated that project management activities include but not limited to defining project scope and requirements, resource management, offering relevant training, providing support on technical expertise, estimating budget and schedule and general risk management. Observation of the activities will ensure sustainability of the WASH projects in Rhonda slums.

The third objective was to determine how funding influence sustainability of water and sanitation projects. Analysis revealed that there was a significant positive relationship between funding and sustainability of WASH projects ($r= 0.401$, $p<0.05$). The correlation was of moderate strength and significant at 0.05 level. This implies that the high degree of sustainability of WASH projects was associated with an average standard of funding.

From the findings, the study revealed that donor agencies and other institutions play a significant role in WASH projects in Rhonda slums. This supports the study done by Khan & Hare (2005) which emphasized the fact that to ensure sustainability of projects, an institutional framework must be improved which is based on enough funding. NGOs must build up reliable systems to enhance good reputation to the implementing body. They also need to foster good will on people and support development plans for sustainability

The study showed there was a substantial investment taken to the WASH projects.However, the funds was not sufficient. It further revealed a lack of awareness on commercial usage with budget policies and internal audits being active. Timely disbursements of funds were efficient which contends to the argument of Yang &Jackson (2011) that availability of finances is fundamental to the success of WASH projects whereby financial uncertainties were a limiting factor for many projects

Concerning the effects of scarce resources on project sustainability, the respondents asserted that there was a weak accountability mechanism which led to incompletion of the project and deprivation of long-term benefits. Finally, they also confirmed that planning becomes a challenge in the execution of various activities. This shows that most projects were not self- sustaining after funds withdrawal hence the need to design a mechanism to address sustainability issues.

The last objective was to assess how technology influence sustainability of water and sanitation projects. Analysis showed that there was a significant positive relationship between technology and sustainability of WASH projects ($r= 0.862$, $p<0.05$). The correlation was of greater strength and significant at 0.05 level. The majority of the respondents felt that the technology adopted would be appropriate in ensuring the success of their projects. This implies that sustainability of WASH projects was associated with higher technological choice. The study showed that the level of adoption of the new technology in the management of WASH projects was still very low hindering projects sustainability.

This study supports the studies by Binder (2008) who argued that adoption of technology is critical to the viability of community-based projects since it eased the operation and maintenance of the facilities. Most of the respondents indicated that users lack adequate knowledge on management, some do not conform to the cultural beliefs. They stated that there should be top management support and proper training on the use of technology. This is in agreement with the findings of Hagedoorn & Cloodt, (2003) who indicated that Project managers have always supported the place of technology in the performance of a project, production process, and human welfare. Continuous economic crises and many project failures are due to poor management and accountability issues which strain limited resources. They argued that projects must include proper technology and integrate operation and maintenance into the development of the project from the initiation stage whereby technological innovation improves the performance of the sustainability

5.4 Conclusion

The study concludes that there is a significant positive relationship between community participation and sustainability of WASH projects in Rhonda slums Nakuru County. Community participation is enlightened about the importance of their engagement in identifying and resolving matters that affect them which are geared towards sustainable development. The study found that it has a moderate influence on project sustainability. Participation of women and community leaders was considered desirable for achieving sustainability. Decision making was done by both men and women at different levels of the project. More importantly, the study revealed that sustainability is a multifaceted process which involves different agencies charged with the responsibility of policy formulation and implementation.

The study also concludes that sustainability of WASH projects is associated with high levels of project management skills of the WASH committee. Management has increased the alignment of development projects with the community needs. There is satisfaction with the management offered by the WASH project with enough resource management and leadership skills. Also,there is sufficient technical expertise to manage the project

The study further concluded that funding has a significant effect on WASH projects sustainability. Both the budget policies and internal audits are effective. However, sustainability of WASH projects was associated with moderate level of funding

Lastly, the study concluded that there was a significant relationship between technology and sustainability of WASH projects. Technology used is not appropriate since most of the users lack adequate knowledge on management

5.5 Recommendations of the study

From the findings and conclusion, the study recommends that the community should be involved in implementation and evaluation of projects at every stage of development and that when WASH management committees are formed, women participation and membership should be encouraged to avoid gender disparity. This can be achieved through organizing meetings on the project site before implementation

On management skills the study recommends that training on leadership and management should be conducted to the grass root level whereby locals should be trained on operation and maintenance of the facilities. WASH management committee and project managers should be enlightened on various skills of management. This can be done through organizing learning sessions at different levels

On funding the study recommends that Nakuru County government in collaboration with other stakeholders should increase the level of funding for the WASH sector and provide mechanisms for ensuring accountability in operation. This can be achieved through proper budgetary allocation.

Lastly on technology, the government and other agencies should advocate for proper planning in the design of the new technologies which should be environmentally friendly. This can be achieved by making policies by the relevant ministry demanding for proper practice in the WASH sector.

5.6 Suggestions for further studies

The researcher suggests further studies on Factors influencing sustainability of WASH projects in other regions to allow for generalization of the same in Kenya

Further studies should also be conducted on the influence of Socio-cultural factors on sustainability of WASH projects especially on gender issues in Kenya.

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APPENDICES

APPENDIX 1: INTRODUCTION LETTER

OTIENO DAVID ALELAH,

P.O. BOX 12118 – 20100,

NAKURU.

TEL: 0700493519

E-MAIL: davidalelah2@gmail.com

Dear Respondent,

My name is Otieno David Alelah and I am a Master of Arts in Project Planning and Management student at the University of Nairobi. The attached questionnaire is aimed at assessing "Factors Influencing Sustainability of Water and Sanitation Projects: A Case of Rhonda Slum Projects in Nakuru County, Kenya". This study is for academic purpose but will be useful for the government and other agencies who are involved in development projects in the community.

The result of this research will be completely confidential and no identification data will be collected. Some of the questions I will ask may be quite personal and I hope they will be okay with you. If however you do not feel comfortable answering any question, please feel free to say so or seek clarification where you do not understand.

Thanks in advance for your co-operation. Your genuine response will be appreciated.

Yours faithfully,

Otieno David Alelah

APPENDIX 2: HOUSEHOLD QUESTIONNAIRE

Research Questionnaire for a study on Factors Influencing Sustainability of Water and Sanitation Projects: A Case of Rhonda Slum Projects in Nakuru County, Kenya

I am a student undertaking Master of Arts in Project Planning and Management from the University of Nairobi. This questionnaire is meant to assist me in collection of data for a study on factors influencing sustainability of WASH projects: A case of Rhonda Slum Projects in Nakuru County Kenya. The items in the questionnaire are for academic purposes only. The responses will therefore be treated with utmost confidentiality. You are not required to provide your name.

Instructions

Please fill in the blanks or put a tick (√) where appropriate to provide the information requested.

PART A: BACKGROUND INFORMATION

1. What is your gender? ☐ Male ☐ Female
2. What is your marital status? ☐ Single ☐ Married ☐ Divorced
3. What is your age bracket? ☐ 18-30 ☐ 31-40 ☐ 41-55 ☐ Above 55
4. What is your level of education?
   a) No schooling ☐
   b) Primary school ☐
   c) Secondary School ☐
   d) Tertiary ☐
   e) University ☐
5. For how long have you stayed in Rhonda?
   a) 0-3 Months ☐
   b) 1-3 Years ☐
   c) 3-5 Years ☐
   d) More than 5 Years ☐

6. What is your occupation?
   a) Farmer ☐
   b) Teacher ☐
   c) Self employed ☐
   d) Social worker ☐
   e) Others please specify……..

PART B: COMMUNITY PARTICIPATION AND SUSTAINABILITY OF WASH PROJECTS

Instructions:

Please fill in the blanks or put a tick (√) where appropriate to provide the information requested.

1. Who makes decision about water and sanitation in the community? Men ☐ Women ☐
2. When water and sanitation projects were introduced in this community who made the decision on selection of construction site for the facility?
   ☐ Community leaders
   ☐ Women groups
   ☐ WASH management committee members
   ☐ All community members
   ☐ Others, please specify…….

3. Which role (s) have the community members played in the implementation of water and sanitation projects in this community?
   ☐ Provision of locally available materials
   ☐ Financial contribution
   ☐ Provision of communal land
   ☐ Other specify…….

4. To what extent do you think the community participated in the planning and implementation of this project? (Rank 1-5)
   (5)To a great extent ☐
   (4)To a moderate extent ☐
   (3) Neutral ☐
   (2)To a small extent ☐
   (1)To no extent ☐

5. In your own opinion to what extent does Community participation influence sustainability of water and sanitation projects? (Rank 1-5)

   (5)To a great extent ☐
   (4)To a moderate extent ☐
   (3)Neutral ☐
   (2)To a small extent ☐
   (1)To no extent ☐

6. Is there any water and sanitation project you are aware of that was began in the community but later failed?

   ☐ Yes
   ☐ No

7. If yes, give one reason why it failed?

   (i)……..……

8. Do you think community participation is important for sustainability of your project?

   ☐ Yes ☐ No

9. If yes, to what extent? (Rank 1-5)

   (5)To a great extent ☐
   (4) To a moderate extent ☐
   (3) Neutral ☐
   (2) To a small extent ☐
   (1) To no extent ☐

10. If No, please give two reasons why community participation is not important

    (i)……

    (ii)……

11. Give two suggestions on what can be done on community participation to enhance sustainability of your facility?

    (i).....

    (ii).....

PART C: PROJECT MANAGEMENT SKILLS AND SUSTAINABILITY OF WASH PROJECTS

Instructions:

Please fill in the blanks or put a tick (√) where appropriate to provide the information requested.

1. Identify two WASH facilities you know about?

   (i)……

   (ii)……..

2. Who manages the facility?

   ☐ Community leaders

   ☐ Women groups

   ☐ WASH management committee members

   ☐ All community members

   ☐ Others, please specify…….

3. Identify two major challenges which normally arise from the use of WASH facilities?

   (i)……..

   (ii)……..

4. Do those who manage respond adequately to the challenges whenever raised? Yes ☐ No ☐

5. Do you think the people appointed to manage the WASH facilities are effective in their work?

   Yes ☐ No ☐ Not sure ☐

The following statement relates to how management skills influence the sustainability of the WASH projects. To what extent are they reflected in this community? Rate as follows; 1=Strongly disagree, 2=Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree

No	**Statements**	**1 SD**	**2 D**	**3 N**	**4 A**	**5 SA**
6	There is sufficient technical expertise to manage the project					
7	There is enough resource management skills for sustainability of the project					
8	The community is satisfied with the overall management offered by the WASH project committee					
9	Project managers have adequate experience in management					
10	Technical advice about the architecture was made available for the project					
11	Management of projects has increased the alignment of development projects with the needs of the host communities					
12	WASH Projects are complex and require multifaceted management skills					
13	Leadership skills of managers are satisfactory					
14	Risk management is satisfactory					
15	There are clear and achievable estimates in the project budget and schedule					

PART D: FUNDING AND SUSTAINABILITY OF WASH PROJECTS

Instructions:

Please fill in the blanks or put a tick (√) where appropriate to provide the information requested.

1. What was the source for financing this project?

   Own finance ☐

   Loan ☐

   Savings ☐

   Donor ☐

   Other, please specify…….

2. How much did the financing partner give you? KSH……
3. What was the total investment cost for this project?……
4. In your own opinion, do you think there is sufficient fund for maintenance and improvement of the facilities? Yes ☐ No ☐ Not sure ☐

5. How would you rate the effectiveness of the following funding policies in enhancing sustainability of this project? Rate as follows; 5=Very effective, 4=Moderately effective, 3= Neutral, 2= Less effective, 1= Not effective

Policies	**1**	**2**	**3**	**4**	**5**
Timely disbursement of project funds					
Donor Planning timeline					
Financial management system					
Internal audit on funds availability					
Budget policies					

6. Does the project generate some income through water sales and other activities?

   Yes ☐ No ☐

7. If yes, who collects the revenue?

a) Treasurer ☐
b) Secretary ☐
c) Chairperson ☐
d) Others, specify…….

8. Does the WASH project own a bank account? Yes ☐ No ☐
9. Do members of the community have access to financial records? Yes ☐ No ☐
10. Do you agree or disagree with the fact that funding influence sustainability of this project?

    Agree ☐ Disagree ☐
11. To what extent would you agree or disagree with the fact that funding influence sustainability of this project?(Rank 1-5)

    (5) Strongly agree ☐

    (4) Agree ☐

    (3) Neutral ☐

    (2) Disagree ☐

    (1) Strongly disagree ☐
12. In your own opinion, give two effects of inadequate funds on sustainability of this project

    (i).....

    (ii).....
13. Do the projects continue well even after the funding is withdrawn by the promoters?

    Yes ☐ No ☐ Not sure ☐

PART E: TECHNOLOGY AND SUSTAINABILITY OF WASH PROJECTS

Instructions:

Please fill in the blanks or put a tick (√) where appropriate to provide the information requested.

1. Which type of technology do you use to dispose human waste?
    a) Pour flush connected to a soak pit ☐
    b) Pour flush connected to a septic tank ☐
    c) Pour flush connected to a sewer connection ☐
    d) Pit latrine ☐
    e) VIP latrine ☐
    f) Other, please specify……
2. How did you choose your design?
    a) Advice from NAWASCO ☐
    b) Advice from MoH ☐
    c) Advice from project promoters ☐
    d) Self Knowledge ☐
    e) Not sure ☐

3. How would you rate the level of operation and maintenance of the facilities? (Rank 1-5)

   (5)Very good ☐
   (4) Good ☐
   (3) Neutral ☐
   (2) Bad ☐
   (1) Very bad ☐

4. Do you think the current technology used is the most appropriate for the facility?

   Yes ☐ No ☐ Not sure ☐

5. If Yes, to what extent? (Rank 1-5)

   (5) To a great extent ☐
   (4) To a moderate extent ☐
   (3) Neutral ☐
   (2) To a small extent ☐
   (1) To no extent ☐

6. If No, please give one reason why the current technology used is not appropriate

   (i)…….

7. In your own opinion, do you think technology influences sustainability of your project?

   Yes ☐ No ☐

8. Was the community involved in deciding the choice of technology used in your WASH facility?

   Yes ☐ No ☐

9. If Yes, to what extent? (Rank 1-5)

   (5)To a great extent ☐
   (4) To a moderate extent ☐
   (3) Neutral ☐
   (2) To a small extent ☐
   (1) To no extent ☐

10. If No, suggest two reasons why the community was not involved

    (i)……

    (ii)……..

11. Suggest two things you think can be done to the current technology to enhance sustainability of WASH facility?

    (i)……

    (ii)……

PART F: SUSTAINABILITY OF WASH PROJECTS

Instructions:

Please fill in the blanks or put a tick (√) where appropriate to provide the information requested.

1. What can you say about WASH projects in terms of strengthening capacities of the community?(Rank1-5)

   (5)Very good ☐

   (4)Good ☐

   (3)Neutral ☐

   (2)Bad ☐

   (1)Very Bad ☐

2. Do you think the WASH project has continued to improve? Yes ☐ No ☐
3. Does the project protect and conserve the environment? Yes ☐ No ☐
4. Do you think the health of the community has improved since the project came? Yes ☐ No ☐
5. What do you think influences sustainability of the facility?

   Community participation ☐

   Project Management Skills ☐

   Funding ☐

   Technology ☐

   Other, please specify……

Thank you for your time and Participation.

APPENDIX 3: KEY INFORMANT INTERVIEW SCHEDULE

KEY INFORMANT INTERVIEW SCHEDULE

1. In your opinion suggest two reasons why community participation does or does not influence sustainability of water and sanitation projects in terms of decision making and general contribution?
2. Kindly give two views concerning the influence of project management skills on sustainability of water and sanitation projects?
3. In your opinion, suggest two reasons why funding influence or does not influence sustainability of water and sanitation projects in terms of sources and investment cost?
4. Kindly give two views concerning the influence of technology on sustainability of water and sanitation projects?

APPENDIX 4: LETTER FROM THE UNIVERSITY

UNIVERSITY OF NAIROBI

COLLEGE OF EDUCATION AND EXTERNAL STUDIES

SCHOOL OF CONTINUING AND DISTANCE EDUCATION

DEPARTMENT OF EXTRA-MURAL STUDIES

Tel 051-2210863

P.O Box 1120, Nakuru

27th April, 2017

Our Ref: *UoN/CEES/NKUEMC/1/12*

To whom it may concern:

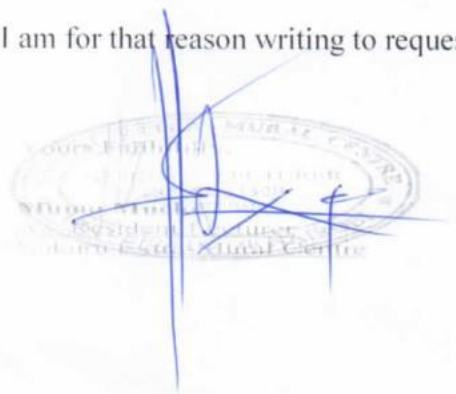
RE: OTIENO DAVID ALELAH-L50/79820/2015

The above named is a student of the University of Nairobi at Nakuru Extra-Mural Centre Pursuing a Masters degree in Project Planning and Management.

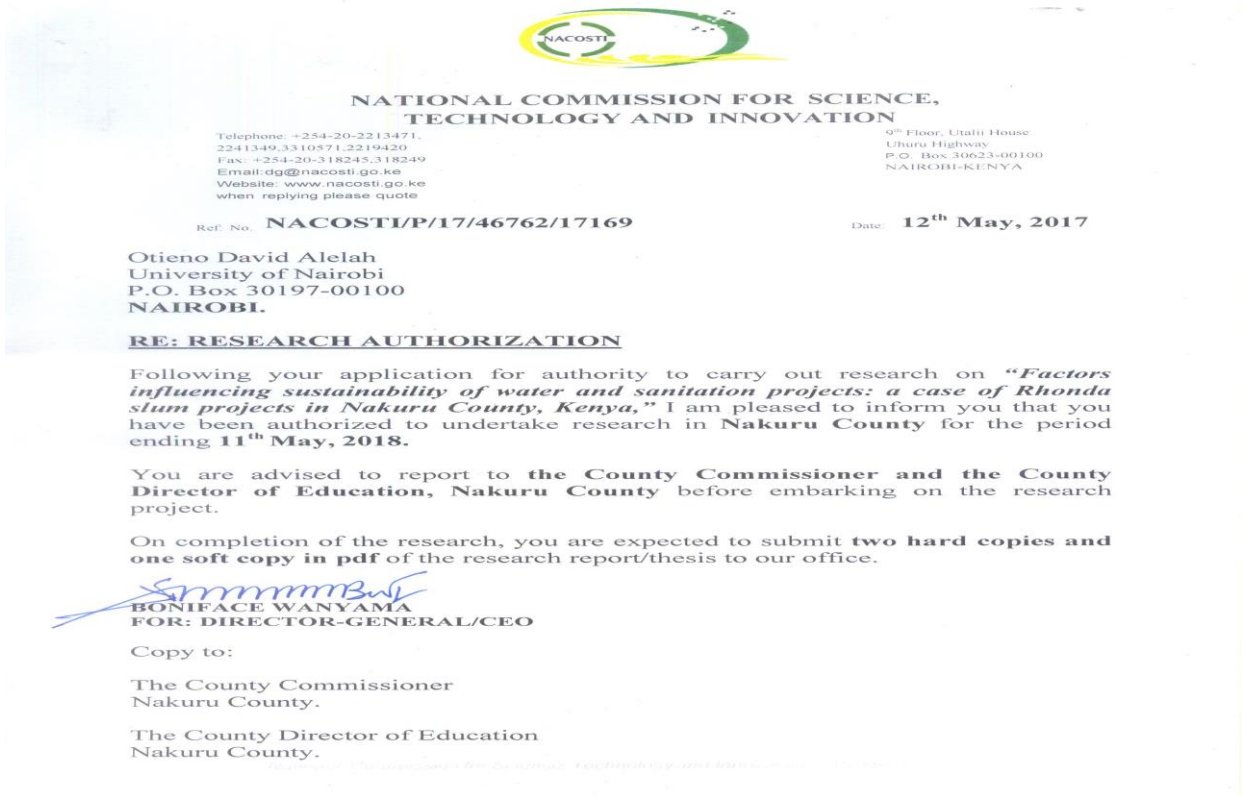
Part of the course requirement is that students must undertake a research project during their course of study. He has now been released to undertake the same and has identified your institution for the purpose of data collection on "Factors Influencing Sustainability of Water and Sanitation Projects: A case of Rhonda Slum Projects in Nakuru County, Kenya."

The information obtained will strictly be used for the purpose of the study.

I am for that reason writing to request that you please assist him.



APPENDIX 5: RESEARCH AUTHORIZATION LETTER



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471, 2241349,3310571,2219420
Fax: +254-20-318245,318249
Email:dg@nacosti.go.ke
Website: www.nacosti.go.ke
when replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref. No. **NACOSTI/P/17/46762/17169** Date: **12th May, 2017**

Otieno David Alelah
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Factors influencing sustainability of water and sanitation projects: a case of Rhonda slum projects in Nakuru County, Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Nakuru County** for the period ending **11th May, 2018.**

You are advised to report to **the County Commissioner and the County Director of Education, Nakuru 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
Nakuru County.

The County Director of Education
Nakuru County.

APPENDIX 6: CLEARENCE LETTER FROM COUNTY COMMISSIONER

OFFICE OF THE PRESIDENT
MINISTRY OF INTERIOR AND
CO-ORDINATION OF NATIONAL GOVERNMENT

Telegrams:" DISTRICTER", Nakuru
Telephone: Nakuru 051-2212515
When replying please quote

COUNTY COMMISSIONER
NAKURU COUNTY
P.O. BOX 81
NAKURU.

Ref No. **CC. SR. EDU 12/1/2 VOL.11/183**

12th June, 2017

Deputy County Commissioner
NAKURU WEST SUB COUNTY

RE: RESEARCH AUTHORIZATION – OTIENO DAVID ALELAH

The above named student has been given permission to carryout research on "***Factors influencing sustainability of water and sanitation projects: a case of Rhonda slum projects*** in ***Nakuru County*** for the period ending **11th May, 2018.**

Kindly give him all the necessary support to facilitate the success of his research.

EDITH KOECH
FOR: COUNTY COMMISSIONER
NAKURU COUNTY

APPENDIX 7: CLEARENCE LETTER FROM COUNTY DIRECTOR OF EDUCATION

MINISTRY OF EDUCATION
State Department of Basic Education

Telegrams: "**EDUCATION**",
Telephone: **051-2216917**
Fax: **051-2217308**
Email: **cdenakurucounty@yahoo.com**
When replying please quote
Ref. NO.
CDE/NKU/GEN/4/1/21 VOL.V/77

COUNTY DIRECTOR OF EDUCATION
NAKURU COUNTY
P. O. BOX 259,
NAKURU.

12TH June, 2017

TO WHOM IT MAY CONCERN

RE: RESEARCH AUTHORIZATION:
OTIENO DAVID ALELAH –
NACOSTI PERMIT NO.P/17/46762/17169

Reference is made to letter ref. NACOSTI permit No. P/17/46762/17169 dated 12TH May, 2017.

Authority is hereby given to the above named to carry out research on ***"Factors influencing sustainability of water and sanitation projects: a case of Rhonda slum projects in Nakuru County Kenya,"*** for a period ending 11th May, 2018.

Kindly accord her the necessary assistance.

MOSES KIARIE
FOR: COUNTY DIRECTOR OF EDUCATION
NAKURU COUNTY

Copy to:

University of Nairobi
P. O. Box 30197-00100
NAIROBI.

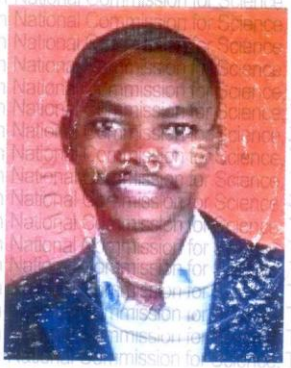
APPENDIX 8: RESEARCH CLEARENCE PERMIT

THIS IS TO CERTIFY THAT:
MR. OTIENO DAVID ALELAH
of UNIVERSITY OF NAIROBI, 0-20300
NAKURU,has been permitted to conduct
research in *Nakuru County*

on the topic: *FACTORS INFLUENCING SUSTAINABILITY OF WATER AND SANITATION PROJECTS: A CASE OF RHONDA SLUM PROJECTS IN NAKURU COUNTY, KENYA.*

for the period ending:
11th May,2018

Permit No : NACOSTI/P/17/46762/17169
Date Of Issue : 12th May,2017
Fee Recieved :Ksh 1000



.....
Applicant's Signature

.....
Director General
National Commission for Science, Technology & Innovation

APPENDIX 9: TURNITIN CERTIFICATE

Turnitin Originality Report
FACTORS INFLUENCING SUSTAINABILITY OF WATER AND SANITATION PROJECTS: A CASE OF RHONDA SLUM PROJECTS IN NAKURU COUNTY, KENYA. by Otieno David Alelah
From FACTORS INFLUENCING SUSTAINABILITY OF WATER AND SANITATION PROJECTS: A CASE OF RHONDA SLUM PROJECTS IN NAKURU COUNTY, KENYA. (Innovative resources)

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