

**FACTORS INFLUENCING SUSTAINABILITY OF DONOR  
FUNDED WATER PROJECTS IN KENYA; A CASE OF  
TURKWEL WARD, LORUGUM LOCATION, TURKANA  
COUNTY, KENYA**

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**A Research Project Submitted in Partial Fulfilment of the Requirements for Degree of  
Master of Arts in Project Planning and Management of the  
University of Nairobi.**

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**DECLARATION**

The Research Project is my original work and has not been presented for any academic award in any other university



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The Research Project has been submitted for examination with our approval as the University Supervisors



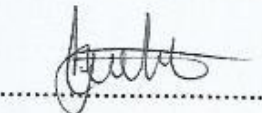
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## **DEDICATION**

I dedicate this Research Project to my lovely wife Prisca Chepkiyeng, My Parents, Dr. Edwin Kimutai Kanda who has been inspirational and Friends for their constant support and encouragement during the entire period.

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## **ABBREVIATIONS AND ACRONYMS**

**ASALs:** Arid and Semi-Arid Lands

**DFP:** Donor funded projects

**DFWP:** Donor Funded Water Projects

**DODL:** Department of Open Distance Learning

**MIW:** Ministry of Irrigation and Water

**NGOs:** Non-Governmental Organization

**O&M:** Operations and Maintenance

**SDGs:** Sustainable Development Goals

**SPSS:** Statistical Package for Social Scientists

**SWP:** Sustainability of Water Projects

**UNESCO:** United Nations of Education Scientific Council

**UNICEF:** United Nations International Child Education Fund

**WASH:** Water Sanitation and Health

**WSP:** Water Service Providers

**WUAs:** Water Users Association

**WHO:** World Health Organization

## **ABSTRACT**

The Study investigated factors influencing sustainability of donor funded water projects in Turkwel Ward Lorugum Location, in Turkana County Kenya. Specifically, the study focuses on the following objectives: to determine how adoption of technology, governance structures and community participation influence sustainability of DFWP . The study was anchored on Outcome and Systems Theory. The study focused on two solar powered boreholes that meant to serve residents of Lorugum Location, its institutions and surrounding locality. The study adopted descriptive survey research design that was convenient based on the its nature. The target population was 188, that is 179 local households, Ministry of water officer's hydrologist, engineer, Hydrologist, Water Users Association Member, NGO representative, WASH officer, County Government of Turkana representative and a representative from the Catholic Dioceses of Lodwar. The sample size of this study was determined by applying Yammane formula, which was 128. According to this formula 119 households were sampled using stratified sampling while the rest were purposively sampled. The research instruments used for data collection is questionnaires, and Interviews guide for local households and others respectively. A pilot study was conducted in the same area, but on other respondents and it tested the validity and reliability of research instruments. Qualitative data was collected by holding face-to-face interviews with Data was collected respondents' others than local households while quantitative data was collected by administering questionnaires. SPSS version 22 software was used to analyse data while thematic analysis was used to analyse qualitative data. From the findings, 71.5% of respondents indicated that training had less influence on the sustainability of donor funded water projects. According to 55.5% and 10% of respondents, community and volunteer took part in repairs and maintenance respectively. Further, 84.9% of the respondents stated that it takes over two years for the technology adopted to influence sustainability of DFWP. Regarding governance, 89.1% of the respondents observed that they their water association adopted democratic management style. The frequency of meetings for members of water user's association was low, 34.5% respondents noted. Local household's financial contribution ability to project activities was pegged at 40.3% and 21.8% low and poor respectively. The frequency of holding project meetings was rated at 52.9% and 36.1% fair and poor respectively. Based on the findings, it was recommended that community sensitization and education should be conducted to change the attitude of locals, the level of education, knowledge and skills relevant to DFWP should be improved. The community should fully own and participate in project activities.

# CHAPTER ONE

## INTRODUCTION

### 1.1. Background Information

Globally, Donors play a critical role in social and economic roles to alleviate human suffering and reduce poverty in underdeveloped countries. Despite access to water, sanitation and hygiene being a human right, billions of people across the world still suffer daily challenges accessing even the most needed services (World Bank, 2013). Around 1.8 billion globally use a source of water that is facially contaminated (Center for Disease Control and Prevention, 2016). Lack of water affects more than 40% of the global population and this figure is expected to increase as the grips of global warming tightens by the day. By managing our water sustainable resources, we are also able to improve and manage food and energy productivity (World Health Organization, 2019).

According to World Health Organization (2019) the world is on track to achieve the safe water target; however, 884 million people would continue using unimproved water sources mainly in sub-Saharan Africa. World Bank (2013) adds that over 1.2 billion people worldwide especially those living in rural areas and ASALS, over 300 million accounting for 88% do not have access to clean and safe water. Such statistics have informed various stakeholders, donors, policy makers, and governments to formulate policies, initiate clean and safe water distribution plans especially to people living in Arid and Semi-Arid Lands, ASALS mostly found in the sub-Saharan Africa.

In Michigan, North America, St-Pierre & Burley (2010) observed that training people on the management and conservation of water resources has seen many donor funded projects, DFP sustain themselves for long despite the challenges faced. St-Pierre & Burley (2010) adds that community education and sensitization foster commitment, which in turn reduces the

operational cost and maintenance of DFPs. The partnership of governments and/or authorities in the beneficiary areas involves the sharing of information and training of water and sanitation officers who should in turn train community members on how best water resources can be managed and conserved.

In Germany, inclusivity, community project ownership and use of technology were vital for the sustainability of any DFP. Notably, Ellersiek (2018) elucidates that involving the government and the community from the beginning of the project until when time is due for withdrawal of funds or end of the project. Project ownership according to Ellersiek (2018) entailed the ability of the community to undertake project activities diligently and with a passion for the sole purpose of seeing it succeed. Use of technology comes hand-in-hand with level of skills and knowledge and the beneficiary community such that an illiterate community will rarely support the use of technology for DFPs.

In Nepal, Asian Continent, the report by United States Agency for International Development, USAID (2017) asserted that organization capacity of community projects was determined by training individuals on governance structures, guidelines and policies that will see the projects advance in terms of development and service delivery. Publications of project activities, scheduling for meetings and requisition of in-kind or cash contribution from the public are among aspects that enhance sustainability of DFP in Nepal. Comparing with Sri-Lanka that faces lack of clear governance structures, donor water funded projects in Nepal have continued to thrive because management boards are occupied by experienced and skilled people who understands community needs, financial management and sustainability strategies.

The support given by the local community determines the establishment of a community project, its ability to withstand challenging needs and its success. Sabbil & Adam's (2015)

study in Sudan observes that lack of community participation and involvement has seen many projects suffer financial challenges especially after donor withdrawal of funds. World Vision (2019) indicated that the success of DFPs was pegged on sound institutional base, adequacy of funds and strong pragmatic approach. Internal systems and framework instituted which include management and governance should be fostered in the local community either by experience, learning or otherwise because it is the core element of the success of DFPs. Pragmatism in the approach adopted included use of modern technology to conduct hydrological surveys, drilling, installations and powering the water for distribution to various household in the neighbourhood.

Kenya is considered a water -scarce nation, it contains renewable freshwater resources of 647m<sup>2</sup> per capita, yet the UN standards require a nation to have 1000m<sup>3</sup> (USAID, 2018). Almost 80% of the country consist of arid and semi-arid land, rainfall in this most ASAL areas are unreliable and unpredictable due to climate change effects. The Kenyan government has tried to achieve millennium development goals MDGs and Kenya Vision 2030 by halving population without access to safe drinking water by 2015 and ensuring water availability and access to all by 2030 respectively.

In Kenya Ngugi & Wanyonyi (2018) noted that nature of technology to be used in DFPs is determined by the amount of information the beneficiary group have. This is largely dependent on attitudes, perceptions and the culture indoctrinated in the community regarding that technology. Although some donors have their own international standards of technological practice to be adopted, the community sometimes deem some technology as not helpful, wasteful, or destructive, which makes them change their views towards its. Stakeholders participation was valued in terms of time taken, ability to make decisions, and commitment of their own resources towards the development and sustainability of DFPs.

In North Tana and Sanitation Project, Kenya, Tato (2017) posits that lack of involvement by the government to deploy technical expertise to train, monitor and conduct periodic repairs to DFPs has continually rendered the success of majority water projects. Failure to provide policy framework to donors and other water stakeholders has trickled down to the management of water associations and committees, which largely determines the sustainability of many projects. Community ownership in terms of protection and contributing financially towards the development of projects especially after donor withdrawal of funds was considered a systemic failure that indicated an evidence of a management crisis.

In DFPs in Samburu, Ltumbesi, Kidombo & Gakuu (2018) observed that technical support and sustainability of donor funded largely relied on community participation. Technical support helps by educating and equipping beneficiaries of the project with skills that would influence their perceptions, practices and community cultures that go against project sustainability. Community participation on the other hand improved capacity building in the identification of project problem, formulation of mitigation of intervention strategies. According to Ltumbesi, Kidombo & Gakuu (2018), technical support and community participation can influence other factors that influence sustainability of DFPs.

Accessibility to safe and clean water in Turkana County remains a challenge based on the report released by Turkana County in 2018. Accordingly, Turkana South has 56% of the household are connected to piped water from the Water Users Association compared to residents of Turkana North who accessibility to water is almost one quarter that of its counterpart in the southern part of the county. Loima Sub-County in the northern parts leads other parts in registering low numbers of people with access to clean and safe water. Despite that, continued established of DFPPs and the enhanced roles of Water Users Association, challenges related to distribution and accessibility of safe and clean water continue looming.



## **1.2.Statement of the Problem**

Most water projects in Kenya funded by donors have been performing as expected with most requiring rehabilitation or non-functional after the donor halts funds. In Kenya, it's quite common to encounter non-functional water projects in most parts of the country (World Vision, 2019). In case the current trend continues, rural water facilities will be completely non-functional limiting access and might enhance the spread of communicable and water borne ailments.

Community water projects funded by donors are critical components in the water provision especially in rural areas and ASALs where government owned companies do not offer services (Macharia 2010). However, while these projects are relied upon by rural and other communities in ASALs, they often fail to provide clean, safe and reliable water to targeted beneficiaries. Majority of these projects are initiated by donors and handed over to the communities to manage after project end life, but they fail to be sustainable.

Lorugum is one of the areas that fall within Arid areas in Kenya that faces perennial drought and limited water resources with a region receiving mean annual rainfall of 500mm. Lorugum Lodete and Locherekalio water projects was initiated by Practical Action East Africa in 2013 and signed an agreement with County Government of Turkana to extend pipeline and increase storage facilities to serve residents. However, lack of sustainability and poor performance of these two boreholes of the water projects initiated demonstrated annual serious and persistent water shortages in this area despite more than 6 years of the existence, the DFP has failed to expand beyond the original area of operation and targeted beneficiaries still experience prolonged water shortages and maintenance challenges. To the best of my knowledge, no study has been conducted in the area to determine some of the factors influencing sustainability of DFPs. It is therefore important to carry out a study on factors influencing the sustainability of DFWRPs with focus on training water technicians, technology

adoption, governance structures, community participation, because this has been the trend of most water projects in Turkana County.

### **1.3.Purpose of the Study**

The purpose of the study is to investigate factors influencing the sustainability of donor funded water projects in Turkwel Ward, Lorugum Location, Loima Sub County of Turkana County, Kenya

### **1.4.Objectives of the Study**

The study is guided by the following objectives

- i. To find out to which extent training of water technicians influence sustainability of donor funded water projects.
- ii. To establish how technology adoption influence sustainability of donor funded water projects
- iii. To establish how governance structures influence sustainability of water donor funded projects
- iv. To determine the extent to which community participation influence sustainability of donor funded projects

### **1.5.Research hypotheses**

- i. Training of water technicians does not influence sustainability of donor water funded projects in Turkwel Ward
- ii. Adoption of technology has no influence on the sustainability of donor water funded projects in Turkwel Ward
- iii. Governance structures have no influence on the sustainability of donor water funded project in Turkwel Ward
- iv. Community participation has no influence on the sustainability of donor water funded projects in Turkwel ward

### **1.6. Significance of the Study**

The findings of these study will contribute to the body of knowledge in the Management of projects, also the findings and recommendations from the study will be critical to communities, water management committees, partners implementing water projects at grass root levels, since they will learn from the best practices and challenges on factors influencing sustainability of DFVPs under study. Moreover, the County Government will understand agents influencing sustainability of water delivery services, Donor agencies will gain from the study because they will understand the need to prioritize on project outcomes and long-lasting impact on sustainability of water projects and also more importantly the study will be of great importance and value to communities manning and controlling local water projects as it will recommend practical solutions to challenge in project sustainability in Project management.

### **1.7. Delimitation of the Study**

The ward has several water infrastructures projects which are funded externally, but the study focussed on two boreholes. Data collected was limited to the household's representative, Water Users Association, Sub County water officers and active NGOs implementing agencies who gave insights on various sustainability related problems facing water projects in the ward. The study covered water projects which were complete and are operational and non-operational in Lorugum area. These delimitations were addressed by conducting an in-depth situational analysis on DFVPs in neighbouring areas and comparing with Loima Sub-county to ensure completeness in deriving conclusions.

### **1.8. Limitations of the Study**

Language barrier, distance and time frame were some of the limitations of this study. In order mitigate these challenges, two research assistants from the local area were engaged to help with household representative survey. The researcher organized to start the research process early in order to cover large distances to reach respondents.

### **1.9. Assumptions of the Study**

It was presumed that community beneficiaries of Lorugum water project and existing water implementing partners still working in the area volunteered to provide honest, accurate information needed for the study. The study considered that the sample was representative of the population and their views will reflect the views of the entire population

### **1.10. Definition of Key Terms**

**Community:** Group of people living in the same locality and share common resources

**Community Participation:** An active involvement of locals in initiating, planning, executing, monitoring and evaluation and decision making in projects they are meant to benefit from.

**Donor funded projects (DFP):** Are those undertakings supported by external donations.

**Governance:** How community water projects are led and governed to determine how water is distributed across the beneficiary community.

**Performance:** The ability of a water project to supply water to targeted beneficiaries with clean and safe water in an effective and reliable manner. Also, the ability of the project committees to leaders to utilize project funds prudently, economically and in organized manner with a budget prepared through active community participation

**Water Project:** A water supply initiative undertaken to supply clean, safe and reliable water for both domestic and livelihoods use.

**Sustainability:** Refers to capacity to maintain, manage water resources to ensure its continuous performance and availability over a long period of time

### **1.11. Organization of the Study**

The project is organized into Five chapters; Chapter one entails background information, problem of the study, purpose of the study, research questions, research objectives, Significance of the study, Assumptions, Limitations and Delimitations of the study, also it contains the definition of Key terms. Chapter two, is critical review of the literature related to the study, presented thematically according to the objectives of the study. This section also contains the theoretical and conceptual frameworks and the explanations of the relationships between variables and a brief exposition of the research gaps. Chapter Three, explains how data was collected, analysed and presented. Chapter Four, analyses and interprets the findings of the study based on respective variables. Chapter Five, contains summary of findings, discussions, conclusions and Recommendations. Finally, the study contains annexes, questionnaires, workplans and Acknowledgement of Referenced Works

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1.Introduction**

This chapter examines the empirical, theoretical literature and conceptual framework that relates to factors influencing sustainability of DFWRPs. The Chapter summarize scholarly studies that was reviewed to provide foundations upon which the findings would be discussed, and conclusions drawn. It also contains the study theoretical framework, conceptual framework and research gaps.

#### **2.2.Concept of sustainability of DFWRP**

The concept of project sustainability can only be well understood under the confines of project management (Njogu, 2014). The ability of a temporary undertaking to achieve its objective based on a defined budget, cost, timelines, and executed diligently by competent human resource, which adhere to the stipulated guidelines and/or laws refers to project sustainability. Vleems (2018) states that project sustainability is based on the ability of the managers to develop new working strategies to avoid challenges, work on reducing project costs and meeting project scope. A project is considered to perform when it achieves all the measures that define that development. Turner, Huemann, Anbari & Bredillet (2010) criticize the approach by other scholars who define sustainability of a project by considering costs, timelines, and scope, they consider that project sustainability should include occupation and health status of users and human resource. Simona & Adina (2013) defined project management in terms of project cycle such that a performing project is one that successfully goes through planning stage, coordination and control and finally closing stage. Kakumba (2010) observes that the management of water resources is an important aspect of that influence sustainable delivery of water resources in both rural and urban populace in Kenya. In the case of Kakumba (2010), sustainability of water resource should mean distribution and

access to safe and clean water to the population without failure during given times of the year either in rural or urban centres.

### **2.3. Training water technicians and sustainability of DFWP**

St-Pierre & Burley (2010) conducted a study in Michigan State, North America and in their research, the researchers sought to determine factors influencing sustainability of DFWPs. The researchers used case study research method and considered an urban population. In their findings, the researchers established that training water users on management and conservation helped in sustaining the sustainability of some DFWPs. Further, the researcher established that training of water users helped in reducing operational costs and lessened the burden of repair and maintenance. Relative to the study by St-Pierre & Burley (2010), this study used survey research design and focused on a population in ASAL and considered training of technicians as a factor influencing sustainability of donor funder projects, but also use of technology, governance structures and community participation as variables influencing sustainability of DFWPs.

Kithoka (2014) conducted a study in Tsiekuru Ward, Kitui County with an aim of determining the influence of training water users' committees on community water projects. The researcher used a descriptive research design and used means and standards deviations as tools of statistics to establish relationship between variables. In the findings, Kithoka (2014) indicated that acquisition of technical and operational skills, which was linked cost, repair and maintenance largely influenced sustainability of donor funded community projects.

A study carried out in Tanzania by Eduvie (2006) established that only about 3100 boreholes and wells of 7000 owned and operated by local communities were operational. In the findings, in both cases, beneficiary communities failed to own the project and maintain them after the donor had pulled out. As expected, wear, tear and lack of repairs and replacement took toll on the water projects to the point of total collapse. The scenario was also partly

attributed to failure to empower beneficiary communities with knowledge and skills to own the water projects and maintain and operate them in perpetuity. Relative to the findings given by Eduvie (2006), this study focused on two completed boreholes, but were not operational. Besides, this study not only considered training of technical experts, but also on repair and maintenance of DFPs. This study outlined and reviewed other factors that included use of technology, governance structure, and community participation

Oxfam (2018) conducted a study in sub-Saharan Africa with an aim of establishing how the operation training on the usability of water pumps influence sustainability of water projects. In the findings, the operations of water pump in rural areas was more likely to be managed by WUAs or self -help group that were typically trained by NGOs to take on the role of operator and revenue collector. Oxfam and other NGOs tended to operate from urban settings in the ASALs e.g. Lodwar and Kakuma town and played a capacity building role for these WSPs during implementation. This study unlike that by Oxfam (2018) will not consider training on water pumps only as a variable influencing sustainability of DFWPs, but would consider training of technicians to mean ability to repair, maintain, manage and conserve water resource.

In a study carried out in Ghana by Auckhinleck (2013), it was established that boreholes in Afram plains and Atebubu districts were repaired promptly after breaking down, thus averting the use of unsafe surface water. Further the study established that community members understood and appreciate their roles of sustaining projects through O&M. The study by Ghana by Auckhinleck (2013) only considered the influence repairing and maintaining on enhancing the sustainability of DFWPs.

#### **2.4. Technology adoption and sustainability of DFWP**

Ellersiek (2018) conducted a study in Germany and focussed on inclusivity, community project ownership and use of technology as key components towards the sustainability of any



DFP. The researcher used case study research design, which helped him establish that use of technology comes hand-in-hand with level of skills and knowledge of the beneficiary community. The researcher considered two populations, rural and urban, which he noted that a technologically empowered population helped in reducing operational and maintenance cost and inculcated a spirit of innovativeness where members improved service delivery through their technologically improvised ways. Relative to the study by Ellersiek (2018) conducted a study in Germany, this study was focussed in Kenya and specifically in Lorugum Ward, Loima sub-county, one of the regions where access to clean and safe water was a problem. This study adopted survey research design where the population was interviewed and responded to questionnaires after which descriptive and inferential analysis were conducted and later results presented.

In their study, Ngugi & Wanyonyi (2018) focussed on the factors influencing sustainability of DFPPs in Embu County. The researchers considered rural population, adopted survey research design, collected data using questionnaires and used only descriptive statistics in analysis. In their findings, they determined that nature of technology used was important and largely influenced performance; however, the type of technology adopted in-house in most cases was not compatible with the acquired technology making it difficult to derive benefits of the newly acquired technology. Relative to the study by Ngugi & Wanyonyi (2018), this study considered a population from ASAL, adopted survey research design, but used both questionnaires and interviews as research instruments. In analysis, this study adopted both descriptive and inferential statistics, which was detailed in giving in-depth analysis of variables and exhibited their relationship accordingly.

### **2.5. Governance structures and sustainability of DFPP**

In Nepal, Asian Continent, USAID (2017) carried out a study on rural populations, the researchers considered using survey research design and but restricted research instruments to

interviews only, which helped them determine that organization capacity of community projects was determined by training individuals on governance structures, guidelines and policies that will see the projects advance in terms of development and service delivery. Other component of governance and management, which the researchers established were the ability of the project managers to publicize project activities, scheduling for meetings and requisition of in-kind or cash contribution from the public are among aspects that enhance sustainability of DFPs. Comparing with Sri-Lanka, which faced lack of clear governance structures, donor water funded projects in Nepal thrived because management boards were occupied by experienced and skilled people who understood community needs, financial management and sustainability strategies. Unlike the study by USAID (2017) that was comparative in nature, this study was focused in one place, adopted survey research design and considered using both questionnaires and interviews as research instruments. This study was not narrowed down to governance structures as the only variable influencing sustainability of DFPs, it also considered training of water technicians, use of technology and community participation.

A study conducted by World Vision (2019) in the sub-Saharan Africa on determinants of sustainability of DFPs, Vision (2019) determined that the success of DFPs was pegged on sound institutional base, adequacy of funds and strong pragmatic approach. Further, the researchers noted that internal systems and framework instituted that include management and governance should be fostered in the local community either by experience, learning or otherwise because they were the core element of the success of DFPs. Adoption of a pragmatic approach included benchmarking to share experiences from performing projects, sharing information, organizing, planning and controlling resources in a cost-effective way that will see the number of beneficiaries increase periodic. The study by Vision (2019) was relative in terms of methodology, but differed in terms of objectives because the former was

focussed on determinants of performance, which included governance structures and financial capacity while this study considered use of technology, governance structures, training of technicians and community participation as key variables influencing sustainability of donor funded water

Mbevi (2016) carried out a study on influence of community participation on sustainability of development projects in Makueni, Kenya and established that governance was critical factor in development. The study found out that all community committee projects had management committees, majority of which had been elected by members of the community. Another significant finding of the study was that committee members had undergone training to enhance their project management skills. The study by USAID (2017), World Vision (2019) and Mbevi (2016) were related in such a way that they all emphasized on the need to equip the management with knowledge and skills necessary to propel projects; however, relatively, this study considered management styles adopted, level of education of the managers and how the two influence sustainability in terms of decision making and other management strategies.

### **2.6. Community participation and sustainability of DFWP**

In Germany, Ellersiek (2018) conducted a study that focussed on inclusivity, community project ownership and use of technology as key components towards the sustainability of any DFP. The researcher used case study research design, which helped him establish that involving the government and the community from the beginning of the project until when time is due for withdrawal of funds or end of the project helped in enhancing project performance. Project ownership according to Ellersiek (2018) entailed the ability of the community to undertake project activities diligently and with a passion for the sole purpose of seeing it succeed. The study by Ellersiek (2018) failed to consider other aspects of

sustainability such as training of technicians; however, they considered other aspects of sustainability just as this study.

In Njogu's (2014) study conducted in Kiambu County, Kenya with a purpose of determining how community participation influenced sustainability of rural borehole projects financed by the National Government Constituency Development Fund, the researcher targeted two projects as done in this study. The researcher used survey research design, which allowed him to use questionnaires as sole research instruments to collect data. Findings were analysed using descriptive statistics and presented in graphs and charts. The findings established that where community participated in electing leaders, sustainability was better than the opposite. Contrary to the study by Njogu's (2014), Tanga and Maliehe (2011) conducted their study in Lesotho and considered community participation in women handicraft projects, in the findings Tanga and Maliehe (2011) revealed that the of poverty were still high among these women, some of the reasons cited for this situation was absence of men, who were more experienced in managing projects, as well as top-down approach, in that the women were not experienced in initiating and managing projects. Incidentally, while women were active in decision-making and implementation, they did not have total control over the money in the hands of committees. The study by Tanga and Maliehe (2011) focussed on women relative to this study that focussed on all the population in terms of gender, age, and occupation.

Sabbil & Adam's (2015) study in Sudan observes that lack of community participation and involvement has seen many projects suffer financial challenges especially after donor withdrawal of funds. Another study by Burns *et al* (2004) conducted in Bristols, which was similar to Sabbil & Adam's (2015) asserted that community participation entailed engaging communities and individuals in making decisions that have an impact on their lives. Targeted beneficiaries of the project should be encouraged to participate in all aspects of the project when they are not willing to do so. Community participation entailed conscious and active

decision making in the project life cycle. Relative to the study by Sabbil & Adam's (2015) and Burns *et al* (2004), this study was conducted in Kenya, in the northern part among the pastoralist community that suffers accessibility to safe and clean water. Further, this study considered other factors influencing sustainability of DFPs such as use of technology, training of technical experts and governance structures.

According to Macharia, Mbassana and Oduor (2015) who conducted their study in Kenyan DFPs, community water project management committees should be trained in managing funds to avert collapse of project due to embezzle or mismanagement of collected from community specifically committee members need to be equipped with critical accountability, budgeting and financial record keeping, skills to enhance accountability and transparency. Compared to the study by Macharia, Mbassana and Oduor (2015), this study suggested that management committees should acquire requisite academic qualification in relevant course that relate to development, management and conservation of water resources.

### **2.7. Knowledge gaps**

The study sought filled a gap that was left out by previous researchers in the area of sustainability of water projects. Ngugi & Wanyonyi (2018) carried out a study on factors influencing sustainability of DFPs, However the study looked at generalized factors and looked at Large service water provider, while the current study examines how socio-economic factors influence sustainability of DFOWPs in rural ASALs areas. Mbevi (2016) studied community participation in sustainability of development projects funded by National Government in Makueni County, and not specifically water projects, consequently they left a gap that the current study sought to fill, since it examined how adoption of technology, training of water technicians, governance structures and community participation influenced sustainability of DFPs. Concisely, majority of researches conducted and related to

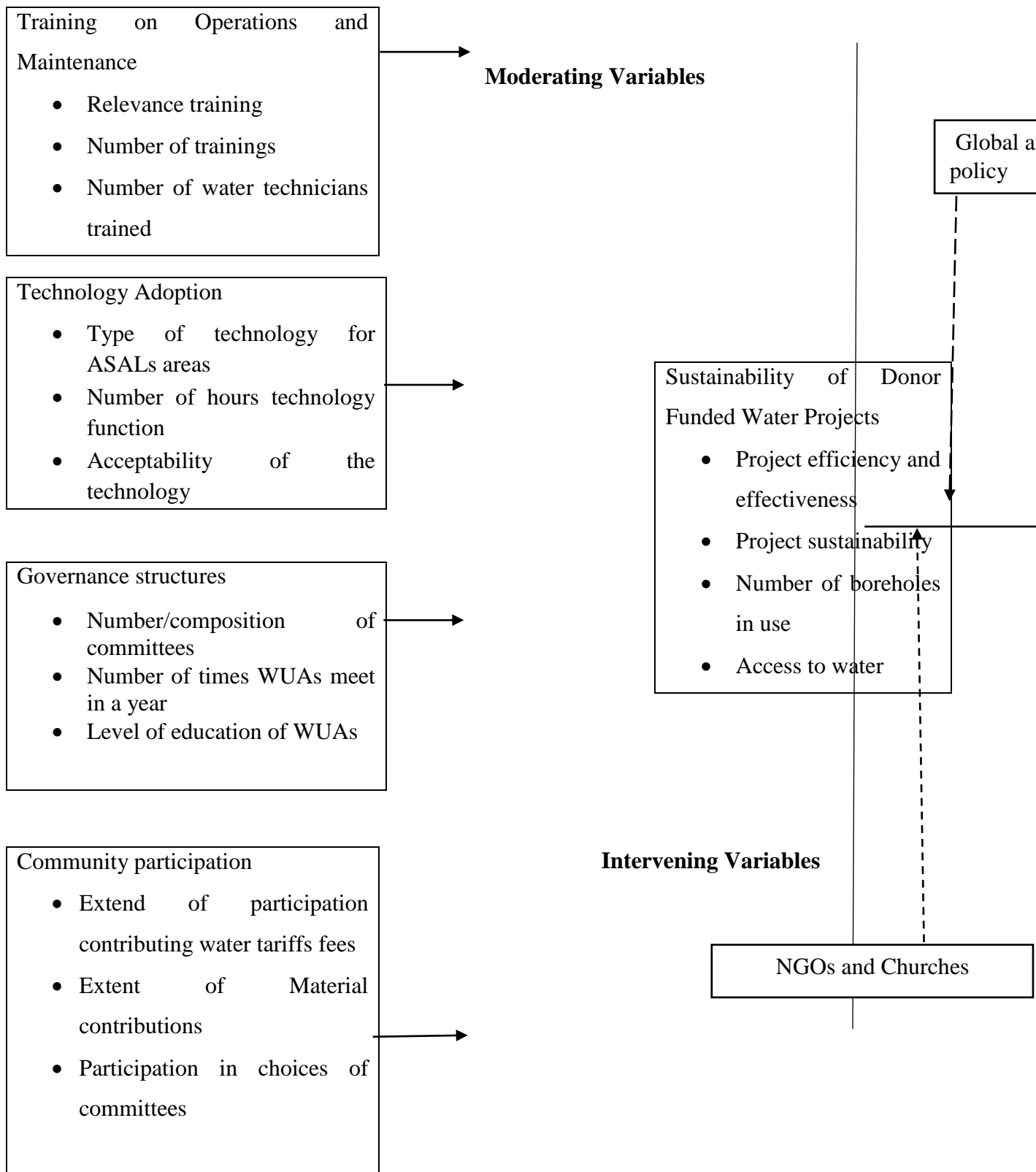
sustainability of water projects were only focussed on factors related to beneficiaries and not a combination of factors that touch on donors and beneficiaries like in this study.

### **2.8. Conceptual framework**

This section discusses the conceptual framework for analysing factors influencing sustainability of performance of DFWP. These factors include; training on operations and maintenance, technology adoption, community participation and governance structures which are indicators of the performance.

**Figure 1: Conceptual framework of the study**

**(Independent Variables)**



**Source: Adopted and Modified from Researcher (2019)**

## **2.9.Theoretical framework**

The study is based on two theories; namely Outcome theory and System theory.

### **2.9.1. Outcome Theory**

Developed by Paul Duignan in 2008, Outcomes theory formed the conceptual basic for thinking about and working with outcome systems in project interventions (Duignan, 2009).

An outcome system is a system that identifies, prioritizes, measures, attributes or hold parties to account for results generated from type of intervention. This theory grounds project delivery aspect of the study since desired interventions must lead to specific outcomes.

Outcome system theory considers strategic plans, management by performance, results chain and result based management systems (Zwikael & Smyrk, 2009). This theory underpins this study by focusing on achieving outcomes in known accountability systems, evidence-based practice systems and the best practice. In this case, the evidence-based practices highlighted in the theory related to community participation, governance structures and training of technicians which influenced sustainability of DFWPs. This theory indicates that a sub-set of interventions within an intervention is capable of bringing meaningful results. In the case of this study, training as a sub-set of intervention will not only improve governance structures but will also improve use technology and foster unity in terms of community participation.

### **2.9.2. System Theory**

The proponent of System theory is Ludwig Von Bertalanffy who invented developed it in 1956 (Ragsdell, West & Wilby, 2012). The theory emphasizes the way in which organized system respond in an adaptive way to cope with significant changes in their external environment to maintain their basic structures intact. Kerzner (2009) asserts that the system theory shapes decision making in human groups and emphasizes their interactions with those of the outside world. The systems theory relates to this study in such a way that dwindling



sustainability of DFwPs would be addressed by the water users committee, which may use various interdisciplinary mechanisms such as management, public relations, counselling, and training among others to address the problem. Systems theory emphasize on the interactions with the outside world and in relating it to this study, the interaction with the outside world might be done to enhance community participation and governance.

### **2.10. Relationships between Variables**

The dependent variable in this study is sustainability of DFwPs. It entails the criteria used to determine the level of sustainability of DFwPs i.e. project efficiency and effectiveness, project sustainability, access to clean and portable water. The first independent variable is training technicians on operations and maintenance, it's a measure of extent to which training water technicians on O&M denoting monetary, materials, skills and contribution of community members to the project and how this influence sustainability. The second independent variable is to establish how technology adoption influence sustainability, investigating which technology suits ASALs areas, solar powered boreholes, availability of materials and linkages to technology experts. The third independent variable on governance structures which examines how composition of WUAs, times committee meets in year, level to which community members decide on various people to manage the water resources, as well as to the extend community are involved in decision making. The last independent variable is community participation through paying for water, provision of land and materials, participation in electing committees and scrutiny of sustainability reports influence sustainability of DFwPs.

### **2.11. Summary of Literature reviewed**

The reviewed literature reveals that performances of community projects is interictally linked to the participation of beneficiary community, the reviewed establishes that when community members participate actively in financial management, governance, operations

& maintenances and monitoring and evaluation projects are more likely to deliver predetermined outcomes.

In ASALs counties most of projects have been mainly feeding the hungry, water, health and sanitation where this activity are minimal. The donor agencies give little attention to the root cause of the problems affecting sustainability of this water projects especially in ASALs areas. The donor agencies help in filling the gap in government work, but the sustainability of this projects is poor after completion and handover of projects to community. Therefore, this situation poses a gap hence needs research. Therefore, there is need to look for ways and means of maintaining and continued sustainability of DFWPs to help alleviate poverty and improve the living standards of these communities.

## CHAPTER THREE

### RESEARCH METHODOLOGY

#### 3.1.Introduction

This chapter features research design, target population, sample size and sampling procedure. Research instruments, data collection procedure and data analysis techniques were highlighted.

#### 3.2.Research design

This study considered survey research design because it considered both qualitative and quantitative approaches. A descriptive survey was used because it was appropriate to cover a small research area and make conclusion about a large area (Kombo & Tromp, 2006). Further, it provided an accurate account of the characteristics of respondents in terms of behaviour, opinions, abilities, beliefs and knowledge of an individual, situation or group

#### 3.3.Target Population

The study population consisted of local community in the area, Water Users Associations (WUAs), NGOs representative working on WASH and Sub County Water officers operating in Loima Sub County.

Table 1: Target Population

Respondents	Target Population
Local Community	179
Water Users Association	1
NGOs representatives, County Gov't of Turkana and Dioceses of Lodwar	4
WASH	1
Sub-County Water officers, Hydrologist, and Engineer and WUA	4
<b>Total</b>	<b>188</b>

### 3.4. Sampling design

Stratified and purposive sampling techniques were used in this study because they were convenient with this study. Stratified sampling was used to identify the local community in terms of gender, age bracket, and occupation. The rationale behind it was to ensure that sampled local community considered are representative and comprise of all the characteristics. Purposive sampling was used to identify Sub-County Water officers, NGO representative, and WASH officers because these respondents had the information needed by this study.

### 3.5. Sampling Procedure and Sample Size

A sample population of 128 was arrived at by calculating the target population of 188 with 95% confidence level and an error of 0.5% using below simplified formula taken from Taro Yamane 1967 (Yamane, 2012).

Yamane (1967) provides a simplified formula for sample size

$$n = \frac{N}{1 + N(e)^2}$$

**Where:** n= is the size of the sample

N=Population

e= is the error of margin

n=128

Table 2: Sample Size

<b>Respondents</b>	<b>Target Population</b>	<b>Sample size</b>
Local Community	179	119
MOW	4	4
FGD WUAs	1	1
NGOs and (Turkana County)	4	4
<b>Total population</b>	<b>188</b>	<b>128</b>

### **3.6. Research Instruments**

Research instruments refer to the strategies or tools the researcher uses in extracting information to be used for a given evaluation/assessment and thereafter make conclusions (Mugenda & Mugenda, 2003). In the case of this study, Structured questionnaires and interview schedule were used to collect information relating to factors influencing sustainability of DFwPs.

#### **3.6.1. Questionnaire**

Structured questions that related to the research objectives were used to extract relevant information from respondents, which facilitated the derivation of conclusions thereafter. The questionnaire comprised of five sections, section one entailed demographic information relating the respondent while section two to five sought to collect information relating to training water technicians, use of technology, governance structures and community participation.

#### **3.6.2. Interview Guide**

Open ended questions that related to research objectives were used during the probe of the Sub-county water officers, hydrologist, water engineer, NGO representative, WASH officer and the WUA committee members. The open-ended questions were meant to make the researcher understand more regarding some of the questions that were not clearly defined in the questionnaire

### **3.7. Data collection procedure**

Quantitative data was collected using questionnaires by administering them to local beneficiaries of two DFwPs in Lorghum sub location and Turkwel location, Turkwel ward, Loima Sub-County. The researcher organized with the respondents on how to collect them after they were respondents to. Two research assistants were contracted by the researcher to

help in data collection and as translators to ensure the locals understand clearly some of the questions asked in local dialect.

Qualitative data was collected by holding face-to-face interview with sub-county water officers, WASH officers, Hydrologists, Water Engineers, WUA committee members, and NGO representative. Responses from the interviews were noted down after informing the respondents on the need to do so.

### **3.8.Pilot Study**

A pilot study was conducted before the main study for the purpose of testing validity and reliability of research instruments. Further, pilot study was conducted to ensure the researcher familiarise with the study area, correct any mistakes that would be inconsistent or address any potential challenges before the main study.

#### **3.8.1. Instrument Reliability**

Reliability of an instrument refer to the degree of consistency with which an instrument gives after being used to collect information from the same population (Kraska-Miller, 2013). Questionnaires were used to test reliability by collecting data using it during the pilot study, entering the collected data in the SPSS version 22 software for determination of Cronbach's Alpha Value, which was meant to test internal reliability of the research instrument. According to Kraska-Miller (2013), a reliability value of over 0.7 means that the research instrument is highly reliable, while 0.49-0.69 means that the research instrument is averagely reliable and a reliability value of less than 0.49 means that the research instrument is lowly reliable.

In Chapter three, it was indicated that reliability test was to be determined using Cronbach's Alpa and after determination, the value realized was 0.793; this indicated that the

questionnaire was 79.3 percent reliable and would give 79.3 percent accurate findings upon repeating data collection process to the same population. See table 3

### **Reliability Test Result**

Table 3: Reliability Test Statistics

### **Reliability Statistics**

Cronbach's Alpha	N of Items
.793	44

### **3.8.2. Instrument Validity**

Validity of an instrument is the ability of an instrument measures what it is intended to measure (Polit & Hungler, 1993). In this study, content validity was tested by collecting data using questionnaires and interviews and thereafter presenting the findings to the research supervisor whose feedback informed the researcher whether the research instrument was valid or not.

### **3.9.Data analysis techniques**

Collected data was analysed using both qualitative and quantitative techniques. Qualitative data was analysed using thematic analysis where interview responses collected were summarized and organized in themes and sub-themes as they relate to research instruments and indicators respectively. Quantitative data collected using questionnaires were analysed in two ways using SPSS version 22 software, one way was to analyse using descriptive statistics where findings in frequencies and percentages were presented in tables, the other way was to analyse using inferential statistics purposely meant to test the hypotheses and more specifically the degree of association between independent and independent variables. Regression analysis was conducted to test hypotheses and determine the degree of association. The regression model adopted was as follows.

$$Y = \mu + X_1\beta_1 + X_2\beta_2 + X_3\beta_3 + X_4\beta_4 + \text{error term}$$

Where

Y= sustainability of DFWP

$\beta_0$ = A Constant

$X_1$ = adoption of technology

$X_2$ = training of water technicians

$X_3$ = community participation

$X_4$ = governance and management

$\beta_i$ = Beta coefficients for  $i = 1, 2, 3, \text{ and } 4$  which indicate per unit change in the dependent as the independent variable changes by one unit.

However, the presence of a moderating variable will be measured through adding Z as a Moderating variable on the model that will regress on each of the five variables as shown.

$$Y_i = \beta_0 + \beta_1 X_1 Z + \beta_2 X_2 Z + \beta_3 X_3 Z + \beta_4 X_4 Z + \mu_i$$

### 3.10. Ethical Considerations

Conducting research requires not only expertise and diligence, but also honest and integrity. Written permission to conduct the research study from the DODL University of Nairobi and getting authorization from the NACOSTI were used to enhance confidence and prepare the respondent regarding the need to conduct data meant for academic purposes. The researcher sought for the consent of respondents before was collected, taking part in data collection was voluntarily. Respondents was informed that data collected was not going to be used to incriminate or victimize them in any way. The researcher informed them that findings of the study would inform the relevant institutions to better their situation.



### 3.11. Operationalization of Variables Table

Table 4: Operationalization of Variables

S/NO	Research Objective	Indicator	Scale	Tools of Analysis
1	To find out to which extent training of water technicians influence sustainability of DFWP	<ul style="list-style-type: none"> <li>• Relevance of training</li> <li>• Type of the training</li> <li>• Number of water technicians trained</li> </ul>	Nominal Ordinal	Descriptive and regression analysis
2	To establish how technology adoption influence sustainability of DFWP	<ul style="list-style-type: none"> <li>• Number of years technology is functioning</li> <li>• Level of acceptability of technology</li> <li>• Suitable technology for ASALs</li> </ul>	Nominal Ordinal	Descriptive and regression analysis
3	To establish how governance structures influence DFWP	<ul style="list-style-type: none"> <li>• Level of education of WUAs</li> <li>• Number/composition of committees</li> <li>• Number of times they meet in a year</li> <li>• Availability of WUAs</li> </ul>	Nominal Ordinal	Descriptive and regression analysis
4	To determine the extent to which community participation influence sustainability DFWP	<ul style="list-style-type: none"> <li>• Financial Contribution</li> <li>• Meetings</li> <li>• Elections</li> </ul>	Nominal Ordinal	Descriptive and regression analysis

## **CHAPTER FOUR**

### **DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION**

#### **4.1.Introduction**

This chapter features response rate, and reliability test statistics, demographic information related to the respondents. Quantitative findings related to the research questions and qualitative findings from interview schedule will also feature in this chapter. Qualitative and quantitative findings will be reviewed and be compared with scholarly findings from which conclusions will be made. This will be followed by an exhaustive discussion that highlights the interconnected and relationship between independent and dependent.

#### **4.2.Questionnaire Response Rate**

With reference to chapter three, the sample size was 128 and this included 119 local community members, 4 officials from the MOW, Loima Sub-County, a representative from the Water Users Association, and 4 representatives drawn from the County Government of Turkana and the Non-Governmental Organization. All respondents took part in the study and the response rate was 100%.

#### **4.3.Findings Related to Demographic Information of Respondents**

This section presents findings that include gender, age bracket, level of education attained and the occupation of the respondents who took part in responding to questionnaires.

Table 5: Findings Related to Demographic Information of Respondents

	Frequency	Percent
<b>Gender</b>		
Male	32	26.9
Female	87	73.1
<b>Total</b>	<b>*119</b>	<b>100.0</b>
<b>Household head</b>		
Yes	51	42.9
No	68	57.1
<b>Total</b>	<b>*119</b>	<b>100.0</b>
<b>Marital Status</b>		
Married	109	91.6
Single	9	7.6
Other	1	0.8
<b>Total</b>	<b>*119</b>	<b>100.0</b>
<b>Age bracket</b>		
Below 20 years	5	4.2
21-30 years	59	49.6
31-40 years	26	21.8
41-50 years	21	17.6
Above 51 years	8	6.7
<b>Total</b>	<b>*119</b>	<b>100.0</b>
<b>Level of education attained</b>		
Never attended school	27	22.7
Primary	73	61.3
Secondary	11	9.2
Tertiary or vocational	6	5.0
University	2	1.7
<b>Total</b>	<b>*119</b>	<b>100.0</b>
<b>Occupation</b>		
Pastoralist	25	21.0
Farmer	27	22.7
Trader	43	36.1
Security officer	3	2.5
Teacher	5	4.2
Other	16	13.4
<b>Total</b>	<b>*119</b>	<b>100.0</b>

Legend \* Number of Respondents

In the findings presented in Table 5, it is evident that 87 (73.1%) respondents were female while 32 (26.9%) respondents were male; an implication that the majority of respondents who took part in this study were female. Out of 199 respondents, 68 (58.1%) stated that they were not household heads while 51 (42.9%) stated that they were household heads implying that

the majority of those actively involved in the issues of donor water funded projects are not household heads and in this case women. In the same table 5, 109 (91.6%) respondents indicated that they were married, 9 (7.6%) stated that they were single while 1 (0.8%) an indication that the majority of water resource users and managers were married and with families. In another case, 5(4.2%), 59 (49.6%), 26 (21.8%), 21 (17.6%), and 8 (6.7%) respondents indicated that they were aged below 20 years, 20-30 years, 31-40 years, 41-50 years and above 51 years respectively. Out of 119 respondents that took part in the study, 27 (22.7%) respondents stated that they never attended schools, 73 (61.3%) stated that they attain primary level of education, 11 (9.2%) indicated that they attained secondary level of education, 6 (5.0%) attained vocational or tertiary level of education while 2 (1.7%) attained university level of education. This meant that the majority of respondents who took part in the study lacked basic education because they only attained primary level of education. In terms of occupation, 43 (36.1%) stated that they were traders, 27(22.7%), indicated that they were farmers, 25 (22.1%) stated that they were pastoralists, while 3 (2.5%), and 5(4.2%) stated that they were security officers and teachers respectively.

#### 4.4.Presentation, interpretation and Discussion of Descriptive Findings

This section presents, interprets and conducts an analytical review of findings with an aim of establishing the relationship, interconnectedness between variables. Scholarly findings were also related to the findings in this study for the purposes of justifying the conclusions to be made.

##### 4.4.1. Training water officials and sustainability of DFWP

Table 6: Extent to which training water technicians influence performance

Response	Frequency	Percent
great extent	34	28.6
moderate extent	56	47.1
little extent	25	21.0
no extent at all	4	3.4
<b>Total</b>	<b>119</b>	<b>100.0</b>

In Table 6, the majority of respondents 56 (47.1%) indicated that there was a moderate extent to which training of water technicians influence sustainability of DFWPs. In another case, 34 (28.6%) stated that there was a great extent to which training of water technicians influence sustainability of DFWPs. In the same table, 6 (21.0%) and 4 (3.4%) respondents stated that there was little extent and no extent at all respectively to which training of water technicians influence sustainability of DFWPs. Implicitly, findings from the majority of the respondents as indicated in table 2 indicates that training had an insignificant influence on sustainability of DFWPs.

Table 7: presence of water technicians trained in the area

Response	Frequency	Percent
Yes	75	63.0
No	44	37.0
<b>Total</b>	<b>119</b>	<b>100.0</b>

From the findings presented in table 7, it is evident that 75 (63.0%) respondents stated that there was presence of trained water technicians in the area of study. Contrary to that, 44 (37%) indicated that there was no presence of trained water technicians in the area of study.

This meant that trained water technicians were present in some sections of the study area, but absent in some sections of the study area.

Table 8: extent to which training water technicians important

Response	Frequency	Percent
very useful	93	78.2
moderately useful	22	18.5
not useful	4	3.4
<b>Total</b>	<b>119</b>	<b>100.0</b>

In table 8, it is evident from 93 (78.2%) of the respondents that training of water technicians was very useful. In another case, 22 (18.5%) respondents indicated that training of water technicians was moderately useful while 4 (3.4%) respondents stated that training water technicians was not useful.

Table 9: How repair and maintenance is conducted on DFWP

Response	Frequency	Percent
Hiring of technicians	34	28.6
Community take part	66	55.5
Volunteer takes part	12	10.1
County government does	3	2.5
Dioceses of Lodwar does	4	3.4
<b>Total</b>	<b>119</b>	<b>100.0</b>

Upon being asked regarding how repair and maintenance is conducted, 66 (55.5%) of respondents indicated that the community took part in repairing indirectly through monthly subscription fee by community and maintaining DFWPs. This was followed by 34 (28.6%) respondents who indicated that water technicians were hired to repair and maintain donor funded water products. In table 9, 12 (10.1%), 4 (3.4%) and 3 (2.5%) respondents stated that volunteers, Dioceses of Lodwar and County Government conducted repair and maintenance

respectively. From the findings presented in table 9, it is evident that the community was largely involved in repair and maintenance of DFWRPs.

Despite the acknowledgment of the fact that training is important as indicated in the findings presented in table 8, where 93 (78.2%) support it, findings in table 4 suggests that training had less significance influence on the sustainability of DFWRPs, this is evident where 85 (71.5%) of respondents supported the idea. Repair and maintenance of DFWRPs is a key component towards sustainability of such an initiative; however, findings in table 9 suggest, less emphasis has been put on it. Evidently, 66 (55.5%) and 12 (10.1%) respondents stated that the community and volunteer took part in repairs and maintenance respectively, but according to the findings from table 4, 73 (61.3%) and 27 (22.7%) of the respondents attained only primary level of education and never attended school at all respectively and in such cases, such a population cannot have requisite skills and knowledge to conduct operational repairs and maintenance, which largely influence performance. This fact has been further supported in the same table 9 where 3 (2.5%) and 4 (3.4%) are respondents who indicated that the county government of Turkana and the Dioceses of Lodwar undertook repairs and maintenance; the two institutions are capable of doing more than that to influence sustainability of DFWRPs.

In the interviews, the Sub-County Water Officer stated

*“lack of technical skills to run the systems has largely influenced the sustainability of DFWRP.”*

Some of the members interviewed in the Water Users Association observed

*“The water users association is a voluntary body formed to oversee proper utilization of water in Lorghum but due to lack of empowerment, limited technical capacities, inequalities and political interference, the association is not able to fully execute its mandate.”*

Representative from the NGO funding some of the water projects stated

*“We do not conduct training for Water Users Associations and water technicians after closure of projects to enhance sustainability of water projects.”*

Findings from the interviews are consistent with the quantitative findings from this study, which summarily indicate that beneficiary community lack knowledge and skills to repair and maintain water projects, they rely on the external expertise, which is hired or from the county government and Dioceses of Lodwar that are rarely available. According to Dillon (2018), a key feature of water project is the constant need for repair and maintenance. The significance of Operational repairs and maintenance is best understood by analyzing water projects that failed owing to negligence. More than two-thirds of water projects in South Africa, Eastern cape had collapsed owing to inadequate Operational repairs and maintenance (World Bank, 2010). The scenario was also partly attributed to failure to empower beneficiary communities with knowledge and skills to own the water projects and maintain and operate them in perpetuality.

In their study Gatari and Mbabazi (2016) recommended that training of water management committee should be done and that untrained community members should not be entrusted to manage water facilities as this could lead to mismanagement and unwarranted system breakdowns. In a study carried out in Ghana by Auckhinleck (2013), it was established that boreholes in Afram plains and Atebubu districts were repaired promptly after breaking down, thus averting the use of unsafe surface water. Further the study established that community members understood and appreciate their roles of sustaining projects through Operational repairs and maintenance



#### 4.4.2. Adoption of technology and sustainability of DFWP

Table 10: Adoption of new technology influence sustainability of DFWP

Response	Frequency	Percent
Strongly agree	11	9.2
Agree	66	55.5
Neutral	36	30.3
Disagree	5	4.2
strongly disagree	1	.8
<b>Total</b>	<b>119</b>	<b>100.0</b>

In Table 10, the majority of respondents (77) were indicated that the adoption of technology influences sustainability of DFWPs. Notably, 66 (55.5%) respondents agreed while 11 (9.2%) strongly agreed that the adoption of new technology influenced the sustainability of DFWPs. Out of 119 respondents, 36 (30.3%) of the respondents were impartial regarding the adoption of technology and its influence on sustainability of DFWPs. In another case, 5 (4.2%) and 1 (0.8%) respondents disagreed and strongly disagreed that the adoption of technology and its influence on sustainability of DFWPs. From the findings in table 10, it was evident that a significant number of respondents were not aware of the impact adoption of technology had on sustainability of DFWPs. Further, the majority were aware that the adoption of technology would influence sustainability of DFWPs.

Table 11: Length of time adoption of technology would take to influence performance

Period	Frequency	Percent
Less than a year	7	5.9
One year	11	9.2
Two years	51	42.9
Three years	50	42.0
<b>Total</b>	<b>119</b>	<b>100.0</b>

From the findings presented in table 11, it is evident that over three quarters of the respondents stated that the length of time adoption of technology would take to influence sustainability of DFWP was over two years. Notably, 51 (42.9%) and 50 (42.0%) respondents

stated that the length of time adoption of technology would take to influence sustainability of DFWP was two and three years respectively.

Table 12: Adequacy of information on water technologies

Adequacy level	Frequency	Percent
very adequate	20	16.8
Adequate	35	29.4
Inadequate	53	44.5
very inadequate	11	9.2
<b>Total</b>	<b>119</b>	<b>100.0</b>

In table 12, out of 119 respondents that took part in the study, 53 (44.5%) of the respondents indicated that there was inadequate information on water technologies. Contrary to that, 35 (29.4%) and 20 (16.8%) respondents stated that there was adequate and very adequate information on water technologies respectively. In the same table, 12 (9.2%) of the respondents stated that there was very inadequate information on water technologies.

Table 13: Water technologies available in the area

Water Technologies	Frequency	Percent
solar powered boreholes	116	97.5
hybrid water systems (genset and solarized)	3	2.5
<b>Total</b>	<b>119</b>	<b>100.0</b>

From the findings presented in table 13, 116 (97.5%) respondents stated that solar powered boreholes were the available technology in the area while 3 (2.5%) of the respondents stated that hybrid water systems (genset and solarized) were common in their area.

According to the findings presented in table 10, 77(64.7%) of the respondents observed that adoption of technology influenced sustainability of DFWPs. However, the absorption of technology among the beneficiary community suffers setbacks. Firstly, 101 (84.9%) of the respondents stated that it takes over two years for the technology adopted to influence sustainability of DFWPs. Secondly, 64 (53.7%) of the respondents indicated that information on water technologies was not adequate. The two cases make it difficult for the adoption of

technology to influence sustainability of DFWRPs and hence the sustainability of the problem facing water users in the study area.

The chief drilling superintended stated

*“Adoption of water technology comes with their own challenges, sometimes it is difficult to integrate the parts with the already installed to enhance performance, a overhaul replacement of parts and equipment is required and such an undertaking is expensive and some parts may not be available.”*

The Monitoring, Evaluation, Accountability and Learning Officer indicated

*“Depending with donors some have specific standards on technologies that should be applied and specification for them to be used due to year of global experience and global standards.”*

Findings from the interviews were in line with findings from the study and were also supported by scholarly findings are explained. According to Martin (2011) technology appropriate level of quality must be assessed user expectations and acceptance, adhere to set standards and be less costly.

#### **4.4.3. Governance structures and sustainability of DFWRP**

Table 14: Kind of management for water association

Management type	Frequency	Percent
Democratic (participative)	106	89.1
Autocratic (dictatorial)	7	5.9
Laissez-faire (minimum interference)	6	5.0
Total	119	100.0

In table 14, it is evident from 106 respondents who accounted for 89.1% of the total respondents that participative (democratic) is the management style adopted for the water association. On the other hand, 7 (5.9%) and 6 (5.0%) respondents stated that autocratic and laissez-faire were the management styles adopted for the water association. This is an implication that whoever assumes leadership or whichever decision to be made must involve consent either by voting or otherwise from the members.

Table 15: Rating governance structures of water association

Indicator	Excellent		Good		Fair	
	F	%	F	%	F	%
Rating governance structure of water association-level of education of users	24	20.2	38	31.0	57	47.9
Rating governance structure of water association-composition of the committee	20	16.8	79	66.4	20	16.8
Rating governance structure of water association-frequency of meetings	22	18.5	56	47.1	41	34.5

In terms of rating governance structure, the majority seems to approve what frameworks or procedures they put in place to aid management of water association. Notably, 57 (47%) of the respondents indicated that the level of education of water users was fair, while 38 (31.0%) and 24 (20.2%) stated that the level of education of members was good and excellent respectively. In another case, 79 (66.4%) stated that the composition of water committee was good while 20 (16.8%) of respondents indicated that the composition of water committee was fair and excellent in each case.

Table 16: Management styles affect sustainability and sustainability of water projects

Agreement level	Frequency	Percent
strongly agree	12	10.1
Agree	81	68.1
Neutral	25	21.0
Disagree	1	0.8
<b>Total</b>	<b>119</b>	<b>100.0</b>

In table 16, out of 119 respondents, 81 (68.1%) agreed that the management styles adopted affected sustainability and sustainability of DFWRPs. Another group of 25 (21.0%) gave neutral responses as they failed to decide whether management styles adopted affected sustainability and sustainability of water projects. In another case, 12 (10.1%) and 1 (0.8%) of the respondents strongly agreed and disagreed respectively that management styles adopted influenced sustainability and sustainability of water projects respectively. This meant

that poor management decisions made democratically influenced sustainability and sustainability of DFWRPs.

Table 17: How effective are the water committees relative to sustainability of water projects

Level of effectiveness	Frequency	Percent
very effective	37	31.1
Effective	55	46.2
Ineffective	22	18.5
very ineffective	5	4.2
<b>Total</b>	<b>119</b>	<b>100.0</b>

In table 17, 55 (46.2%) and 37 (31.1%) who formed the majority of the respondents indicated that the water committees were effective and very effective respectively. Different from that was a group of 22 (18.5%) and 5 (4.2%) respondents observed that the water committees were ineffective and very ineffective respectively relative to sustainability of water projects.

From the findings presented in table 14, it was evident that 106 (89.1%) of the respondents stated that they their water association embraced democratic management style of governance and in table 16, 93 (78.2%) of the respondents indicated that management style adopted by water associations influenced sustainability of DFWRPs. Effective management goes hand-in-hand with skills, competence and knowledge acquired, but 57 (47.9%) of the respondents observed that the level of education of the management was not up to the required standards and indication that chances of mismanaging the water association were high. Further, frequency of meetings was relatively low, 41 (34.5%) of the respondents noted. In such cases where governance structures are weak, management styles is poor and people in-charge of implementing the decisions made are not competent and skilled, influence negatively the sustainability of DFWRPs.

The chief drilling superintendent observed

*“Lean structures ensure faster decision making and service delivery as opposed to long structures which are too bureaucratic.”*

The sub-county water officer stated

*“Poor management of water systems due to lack of community ownership largely influence negatively sustainability of DFWP.”*

Monitoring Evaluation Accountability and Learning Officer from an NGO indicated

*“Government structures are the set standards for Donor entry hence all donor and partners have to conform with government structures for them to implement projects.”*

The aforementioned findings from the interviews are related to the findings from this study, which were also supported by scholarly findings. Mbevi (2016) carried out a study on influence of community participation and governance on sustainability of development projects in Makueni, Kenya and established that governance was critical factor in development. The study found that all community committee projects had management committees, majority of which had been elected by members of the community. In the findings, it was also established that the level of education, competence and skills influenced management of community projects. The importance of capacity building of water management committees is to enhance project sustainability and sustainability is emphasized by Bamberger and the World Bank (1998).

#### 4.4.4. Community Participation and Sustainability of DFWP

Table 18: Did you or any committee member take part in site identification, trenching & in-kind contribution?

Response	Frequency	Percent
Yes	99	83.2
No	20	16.8
<b>Total</b>	<b>119</b>	<b>100.0</b>

In the findings presented in table 18, it is evident that 99 (83.2%) of the respondents agreed that they took part in site identification, trenching and in-kind contribution for the water association. Contrary to that, 20 (16.8) of the respondents disagreed, they did not take part in site identification, trenching and did not make any in-kind contribution.

Table 19: Rating Community Participation of water resources after withdrawal of donor funds

Indicator	Good		Fair		Poor	
	F	%	F	%	F	%
Rating community participation in election of water resource after donor withdrawal	40	33.6	38	31.9	41	34.5
Rating community participation in meeting of water resource after donor withdrawal	13	10.9	63	52.9	43	36.1
Rating community participation in financial contribution towards water resource after donor withdrawal	45	37.8	48	40.3	26	21.8

In terms of rating community participation in table 19, 41 (34.5%) forming the majority of the respondents rated community participation in elections as poor after donor withdrawal while 40 (33.6%) rated community participation in elections after donor withdrawal as good. The rest of the respondents 38 (31.9%) rated community participation in elections as fair after donor withdrawal. On rating community participation to hold and attend meetings, 63 (52.9%) and 43 (36.1%) respondents rated them as fair and poor respectively. A group of 13 (10.9%) of the respondents rated community participation in holding meetings as good. In the same table 15, 48 (40.3 %), 45 (37.8%) and 26 (21.8%) of the respondents rated community participation in financial contribution as fair, good and poor respectively after donor withdrawal of funds.

Table 20: Project ownership, decision making, and water projects serving the intended purpose

Indicator	Strongly agree		Agree		Neutral		Disagree		Strongly disagree	
	F	%	F	%	F	%	F	%	F	%
Water project fully owned by target beneficiaries of the projects	13	10.9	74	62.2	0	0.0	32	26.9	0	0.0
Community involved in decision making	93	78.2	13	10.9	0	0.0	12	10.1	1	0.8
Water projects performing according to the expectation	3	2.5	20	16.8	0	0.0	76	63.9	20	16.8
Water projects are serving the intended purpose	6	5.0	5	4.2	0	0.0	82	68.9	26	21.8

According to the findings presented in table 20, 74 (62.2%) agreed that the water project was fully owned by target beneficiaries of the project while 32 (26.9%) disagreed on the idea that water project was fully owned by target beneficiaries of the project. In another case, 13 (10.9%) of the respondents strongly agreed that the water project was fully owned by target beneficiaries of the project. In this case, it was implied from the majority of respondents that the project was fully owned by local communities. In terms of decision making, 93 (74%) and 13 (10.9%) of the respondents strongly agreed and agreed respectively that the local community was involved in decision making. Different from that was a group of 12 (10.1%) respondents who disagreed on the idea that the local community was involved in decision making.

Regarding sustainability of water projects, 76 (63.9%) and 20 (16.8%) disagreed and strongly disagreed respectively on the idea that water projects were performing according to the expectation. From such a finding, it is true that DFWRPs were not performing according to the expectations. In another case, 82 (68.9%), and 26 (21.8%) disagreed and strongly disagreed respectively that DFWRPs were serving intended purpose. Although 6 (5.0%) and 5 (4.2%) of the respondents strongly agreed and agreed respectively that the DFWRPs were serving



intended purposes, the majority held their views and opinions on the fact that the water projects did not serve intended purposes.

Table 21: level of commitment of county and community benefitting from water projects

Level of commitment	Frequency	Percent
Very committed	3	2.5
Committed	11	9.2
Less committed	80	67.2
Not committed at all	25	21.0
<b>Total</b>	<b>119</b>	<b>100.0</b>

In table 21, out of 119 respondents, 80 (67.2%) stated that the community benefitting from DFWRPs and the county government of Turkana were less committed towards the management of the water resource. Giving almost similar views, 25 (21.0%) of the respondents indicated that the community benefitting from DFWRPs and the county government of Turkana were not committed at all towards the management of the water resource. Nevertheless, 11 (9.2%) and 3 (2.5%) of respondents stated that the community benefitting from DFWRPs and the county government of Turkana were committed and very committed respectively towards the management of the water resource.

Table 22: effects of donor withdrawal of donors in water projects

Level of sustainability	Frequency	Percent
Project continued normally	39	32.8
Dismal performance	78	65.5
Technical challenges	2	1.7
<b>Total</b>	<b>119</b>	<b>100.0</b>

In terms of evaluating the effects of donor withdrawal of funds and sustainability of water projects, 78 (65.5%) respondents stated that there was dismal sustainability while 39 (32.8%) and 2 (1.7%) indicated that the project continued normally and the project experienced technical challenges respectively. Implicitly, it is evident that the majority of

DFWPs sustainability declined after donor withdrawal of funds may be because of poor management, lack of expertise, lack of community participation and failure to establish financial and other mechanisms that will sustain the project.

Community participation in project management is essential towards the sustainability of such a project. In the findings presented in table 20, 99 (83.2%) of respondents indicated taking part in site identification, trenching and contribution in kind to project activities. However, upon further inquest, it was established that DFPs were not performing based on the expectation, table 20, 96 (80.7%) of the respondents disagreed that projects were not performing based on the expectations. Further, the sustainability of many projects declined after donor withdrawal of funds. In table 19, 63 (52.9%) and 43 (36.1%) of the respondents stated that the frequency of holding project meetings was fair and poor respectively. Further, the ability of beneficiaries to contribute money for project sustainability was fair and poor as indicated by 48 (40.3%) and 26 (21.8%) respectively. The responded added that most of the water projects were not serving intended purposes, 108 (90.7%) of the respondents confirmed. The level of commitment to the project by the county government and the community was low such that 80 (67.2%) and 25 (21.0%) of the respondents stated that the county government and the community were less committed and were not committed at all to the project respectively.

The chief drilling superintendent stated

*“Community Participation in donor funded projects fosters a sense of ownership hence caring for the infrastructure.”*

The Hydrologist in the interview commented

*“Community participation in donor funded projects enhances ownership and boosts security.”*

Regarding community participation, the sub-county water officer stated

*“There is still more to be done on community ownership as only 50% owned their projects”*

The sub-county water officer added that there was poor management of DFWPs because of lack of project ownership by the community.

Members from the water users association indicated that

*“The continuous loss of livestock to drought effects is subjecting many residents of Lorugum to abject poverty and so most of them are not able to raise money to repair broken pumps, pay electrical bills, procure new tanks, pipes or even hire technicians to service water lines. Worsening drought in Turkana is increasingly causing malnutrition among children and has turned about 80% of population to food aid.”*

In his response, the WASH coordinator stated that

*“High Community participation is vital for the success of water projects.”*

Monitoring, Evaluation Accounting and Learning officer stated

*“Community participation determine the sustainability of a project and influence on the support for the implantation”*

Findings from the interview coincided with findings from the study in such way that community participation is essential toward improving management and sustaining the project.

According to Baiochi (2005), communities that budget together to achieve increased effectiveness in their projects, promote the welfare of the poor and avert the negative effects to bureaucracy exhibited in top-down development. In a study carried out in Kiambu County, Kenya to establish how community participation influenced sustainability of boreholes funded by government, Njogu (2014), established that where community members participate actively in financial management of boreholes projects, project sustainability was better than where participation was minimal. Another study carried out by

Kinyua *et all* (2015), in Kieni, Nyeri County, Kenya to establish financial sustainability of community water arrived at significant findings. It was found that community members contribute cash and building materials for water projects, hence the need for prudent and accountable financial management among project leaders. Community members also paid membership and user fees to access water. Another study carried out in Tanzania by Eduvie (2006) established that only about 3100 boreholes and wells out of 7000 owned and operated by local communities were operational. In both cases, beneficiary communities failed to own the project and maintain them after the donor had pulled out. As expected, wear, tear and lack of repairs and replacement took toll on the water projects to the point of total collapse.

#### 4.5. Findings based on Inferential Statistical

This section provides statistical tests that sought to establish relationships and association between predictor and dependent variables. Ideally, the section sought to test research hypotheses.

Table 23: Regression analysis between Sustainability of donor funded projects, adoption of technology, community participation, training of water officials, governance and management

<b>Model Summary</b>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.550 <sup>a</sup>	.423	.384	.531

a. Predictors: (Constant), training of water technicians, adoption of new technology, governance structure, community participation,

In the findings presented in table 23, the value of R indicates the degree of correlation between predictor variables and the dependent variable and in this case, the correlation between independent and dependent variable was 0.550. The value of R squared, 0.423 indicated that the proportion of variance in sustainability of DFWRPs explained by the

predictors. Considering that the value of R squared would change upon additional predictors, the value of adjusted R squared, which was 0.384, was reliable.

Table 24: Analysis of variance between sustainability of DFWP, adoption of technology, training of water technicians, governance and management of water projects

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.445	5	1.689	3.163	.010 <sup>b</sup>
	Residual	60.345	113	.534		
<b>Total</b>		<b>68.790</b>	<b>118</b>			

a. Dependent Variable: sustainability of DFWP

b. Predictors: (Constant), training of water technicians, adoption of new technology, governance structure, community participation

In the findings highlighted in table 24, it is clear that  $F(5, 113) = 3.163$  and the p-value, which was 0.010, was less than the level of significance adopted for the study (0.05 or 5%). This meant that the null hypotheses were rejected and the alternative hypotheses accepted such that there existed a statistically significant relationship between adoption of technology, training of water technicians, community participation, governance and management. In a move to conduct an F-test, F critical values (from F tables at 0.05) were compared with values of F computed values (from table 20) and it was established that the values of F critical were less than the value of F computed such that (subtracting 1 from each of the degrees of freedom- gives  $df_x=4$  and  $df_y=112$  and after reading the same values from the F statistical tables) the values become 2.4472, which is less than the value of F computed, 3.163. This further strengthens the idea that there existed a statistical significant relationship between adoption of technology, training of water technicians, community participation, governance and management.

Table 25: Simple linear regression between sustainability of DFWP, adoption of technology, training of water technicians, governance and management of water projects

Model	Coefficients <sup>a</sup>			t	Sig.
	Unstandardized		Standardized		
	B	Std. Error	Beta		
(Constant)	2.306	.366		6.296	.000
adoption of new technology	.429	.542	.655	2.638	.011
training of water technicians	.517	.492	.579	2.740	.009
community participation	.374	.152	.318	3.365	.017
governance structure	.540	.055	.228	2.565	.002

a. Dependent Variable: sustainability of DFWP

According to the findings in table 25, there is a positive linear relationship between sustainability of DFWPs, adoption of new technology influence sustainability of donor water projects, extent to which training water technicians influence performance, management structures and community participation such that a unit increase in the predictor variable increases sustainability of DFWP by a given coefficient value. The linear relationship between sustainability of DFWPs and predictor variables is shown in the following equation

$$Y=2.306+0.429X_1+0.517X_2+ 0.374X_3+ 0.540X_4+ \text{error term}$$

Where

Y= sustainability of DFWP

X<sub>1</sub>= a measure of adoption of technology

X<sub>2</sub>= a measure of training of water technicians

$X_3$ = a measure of community participation

$X_4$ = a measure of governance and management

From the linear relationship, it is true that a unit increase in adoption of technology, training of water technicians, community participation, governance and management leads to a 0.429, 0.517, 0.374, and 0.540 increase in sustainability of donor funded water project respectively.

Hierarchically, from the beta unstandardized coefficients, it was deduced that governance structures influence sustainability of DFWP more than other independent variables, training of water technicians, adoption of water technology and community participation follows closely with their beta unstandardized coefficients as 0.517, 0.429 and 0.374 respectively.

## **CHAPTER FIVE**

### **SUMMARY OF FINDINGS, CONCLUSIONS, RECOMMENDATION AND SUGGESTIONS**

#### **5.1.Introduction**

This chapter features a summary of both descriptive, inferential and qualitative findings that relate to research hypotheses and research questions. Conclusion relative to findings from each research objective will be presented in this chapter. This chapter will also feature recommendations for policy and, it further gives suggestion practice for further research.

#### **5.2.Summary of Findings**

This study investigated the influence of training water technicians, adoption of technology, governance structures a community participation on sustainability of DFWPs. In each case, descriptive and inferential statistical analysis was conducted and the summarized findings are as follows

##### **5.2.1. Training water officials and sustainability of DFWP**

From the findings, 93 (78.2%) respondents considered training as important; contrary to that, where 85 (71.5%) indicated that training had less significance influence on the sustainability of DFWPs. Regarding repair and maintenance 66 (55.5%) and 12 (10.1%) respondents stated that the community and volunteer took part in repairs and maintenance respectively. Out of 119 respondents 3 (2.5%) and 4 (3.4%) respondents stated that the county government of Turkana and the Dioceses of Lodwar undertook repairs and maintenance respectively. In the interviews, the sub-county water officer stated that lack of technical skills to run the systems influenced the performance. Members from the Water Users Association reiterated the views given by the sub-county water officer. WASH officers from NGOs observed that they did not conduct training to water user association and technical officers after closure of projects.



### **5.2.2. Adoption of technology and sustainability of DFWP**

According to the findings presented, 77(64.7%) of the respondents observed that adoption of technology influenced sustainability of DFWPs. Out of 119 respondents, 101 (84.9%) of the respondents stated that it takes over two years for the technology adopted to influence sustainability of DFWPs. Relative to the same, 64 (53.7%) of the respondents indicated that information on water technologies was not adequate. In the interviews, the chief drilling superintendent stated that sometimes, it was difficult to integrate new and old technology. Monitoring, Evaluation, Accountability and Learning Officer stated that some donors have their own technological standards, which might not apply in the study area.

### **5.2.3. Governance structures and sustainability of DFWP**

From the findings presented, 106 (89.1%) of the respondents observed that they their water association adopted democratic management style of governance. In related information given, 93 (78.2%) of the respondents stated that management style adopted by water associations influenced sustainability of DFWPs. The frequency of meetings for members of water user's association was low, 41 (34.5%) noted. The Chief drilling superintendent stated that lean governance structures ensured faster decision making and service delivery as opposed to long governance structures, which were bureaucratic.

### **5.2.4. Community participation and sustainability of DFWP**

According to the findings, 99 (83.2%) of respondents indicated taking part in site identification, trenching and contribution in kind to project activities. DFWPs were not performing based on the expectation, 96 (80.7%) confirmed this. Out of 119 respondents 63 (52.9%) and 43 (36.1%) of the respondents stated that the frequency of holding project meetings was fair and poor respectively. Further, the ability of beneficiaries to contribute money for project sustainability was fair and poor as indicated by 48 (40.3%) and 26 (21.8%) respectively. According to 108 (90.7%) of the respondents, that most of the water projects

were not serving intended purposes. The level of commitment to the project by the county government and the community was low such that 80 (67.2%) and 25 (21.0%) of the respondents stated that the county government and the community were less committed and were not committed at all to the project respectively. From the interviews, the chief drilling superintendent states that community participation forged a sense of ownership and caring for the infrastructure. Hydrologist shared the same sentiments as the chief drilling superintendent while the sub-county water officer noted that community 50% of community projects not owned by members. Community members indicated that high poverty levels and domineering on livestock has affected their livelihoods negatively. Monitoring, Evaluation Accounting and Learning officer stated that Community participation determined the sustainability of a project and influenced the support for the implantation

### **5.3.Conclusion**

There is little or no training at all conducted at the community level to enhance or improve DFWRPs. The perception, and attitude of the community towards training of water technicians is negative that is why they feel it has a less significance on the level of sustainability of DFWRPs.

The level of education for DFWRPs is low and this explains the slow adoption of water technology. There is little or no survey conducted before the adoption of a given form of water technology, a survey prior to adoption could have influenced the sustainability of DFWRPs. Information regarding water technology is limited and few people who lack interest access it

The management style adopted is not effective and efficient in influencing the sustainability of water users' associations. Few members make uninformed decision, which affect the

wellbeing of the entire DFP because few members might be meeting or managing the affairs of the water association.

Water project have not been fully owned by the community, a few members are involved in the management, affairs, contribution and take responsibility for any activity taking place on behalf of water associations.

## **5.4.Recommendations**

### **5.4.1. Recommendations for Policy and Practice**

The National Government in collaboration with the County Government should employ and train water technical officers who should be deployed in every sub-county to help in the management of community water projects especially in ASAL areas.

The county government should enact laws that require all donor community projects should be registered to ensure that they are supervised and regulated effectively to avoid closure especially after donor withdrawal of funds. Through registration, it will be easy to establish the number of officers to be deployed, location and budget for their maintenance.

NGOs should adopt a situation where withdrawal of funds is done at a gradual way and not once to allow a smooth transition to avoid failure of DFVPs. These organizations should also train members to reduce the amount spent on hiring technical expertise.

There is the need to have management of water associations and other community projects to further their studies in order to increase their skills not only to be used in the adoption of new technology, but also to manage finances and other operations of the associations under them.

The community should fully own projects that they benefit from for sustainability, and protection to avoid failure

#### **5.4.2. Contribution to the body of knowledge**

This study focussed on factors influencing the sustainability of DFWRPs, other factors other than training of technicians, adoption of technology, governance structures and community participation scholars can consider the following

Institutional factors influencing sustainability of donor funded water projects

Socio-cultural factors influencing sustainability of donor funded water projects

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## APPENDICES

### APPENDIX I: RESEARCH INTRODUCTORY LETTER

ABRAHAM KISUMBAT KISANG

P.O Box 5111-30100

ELDOERT

Dear Respondent,

I am a Masters student at University of Nairobi, pursuing a Master of Arts degree in Project Planning and Management. As a requirement of the institution, I am supposed to conduct an academic research in order to meet the requirement as a master degree graduate. I am currently undertaking a research study on “Factors influencing the sustainability of donor water funded projects in Turkwel Ward, Loima Sub County of Turkana County, Kenya.”

You have been selected to participate in this study and I am kindly requesting you to assist in providing the required information to the best of your knowledge by responding to the questionnaire attached. The information is strictly for academic purposes and personal information will be handled with utmost confidentiality. Your kind assistance will be highly appreciated.

Yours faithfully,



Abraham Kisumbat Kisang

Master Student University of Nairobi

**APPENDIX II: HOUSEHOLD QUESTIONNAIRE**

**INSTRUCTIONS:** Using a tick ( ) to respond to close ended items.

Name of Interviewer: ..... HH Number: .....

**SECTION ONE: DEMOGRAPHIC INFORMATION**

1: Please indicate your Gender 1. Male  2. Female

2: Indicate whether you are head of the household 1-Yes 2-No

3: Indicate your marital status? Tick the box

Married  Single  Any other specify

4: Indicate your age group

Below (20)  21-30 years  31-41 years  41-50 years  Above 51 years

5: Indicate your level of education

Never attended school [ ] Primary level [ ] Secondary education [ ] Tertiary or vocational level [ ] University level [ ]

6: Main Occupation: Pastoralist [ ] Farming [ ] Trader [ ] Security [ ] Teaching [ ] Medical [ ] Others [ ]

**SECTION TWO: FACTORS INFLUENCING SUSTAINABILITY OF DFWP**

**(b). Training Water Technicians and Sustainability of DFWP**

7.To what extent does training water technicians influence sustainability ofDFWP, Rate as follows A.=To a great extent, B. Moderately C. To a little extent, D.=To no extent,

		1	2	3	4
a	To a great extent				
b	Moderate				
c	To a little extent				
d	To No extent				

8. In your location are there trained water technicians trained on operations and maintenance and management of water projects funded by donors? Yes [ ] No [ ]

9.To what extent do you think training water technician is useful in operations and maintenance on the sustainability ofDFWP in Lorghum Location?

Very useful ( ) Moderately useful ( ) Not Useful ( )

10.Are trained members of water committee involved in the operation and maintenance of water projects? Yes ( ) No ( )

11. How do your repair and maintenance of water projects in your area after the donor has left the area? **(Comment on this)**

.....  
 .....

**(b). Technology Adoption and Sustainability of DFWP**

12.To what extent would you agree or disagree that technology adaption influences sustainability of DFWP?

		1	2	3	4	5
a	Strongly Agree					
b	Agree					
c	Neutral					
d	Disagree					
e	Strongly disagree					

13. To what extent according to your understanding, technology adoption influenced sustainability of DFWP in your area, **rate on a scale, according to functionality of water system has been functional** ,1=Less than a year, 2=1 year ,3= 2 years, 4 =above 3 years

		1	2	3	4
A	Less than a year				
B	One year				
C	Two years				
D	Above 3 years				

14.How would you rate the adequacy of information on available water technologies in your community?

1. Very Adequate
2. Adequate
3. Inadequate
4. Very Inadequate

15.To your understanding, which of the following water technologies perform better in your location and serves larger population?

1. Indian Mark two
2. Blue pumps
3. Solar Powered boreholes
4. Hybrid water system (Genset and solarized)

**(c). Governance Structures and sustainability of DFWP**

16.What is the kind of management does Water Users Association employ in the management of the water projects in your community?

1. Democratic (participative)
2. Autocratic (dictatorial)
3. Leisser-faire (minimum interference)
4. Any other specify

17.How would you rate the governance structures and organization of water user’s association *based on the following statements on the table below*, on how it influences sustainability of donor water funded project in Lorghum location? Rate as follows

1=Strongly agree, 2=Agree, 3=Disagree

		1	2	3
a	Level of education on Water Users Associations			
b	Composition of the committee			
c	Frequency of meetings held			

18.To what extent would you agree or disagree with the fact that management styles affect sustainability of the water project after donor funding is withdrawn

1. Strongly agree
2. Agree
3. Neutral
4. Disagree

19.How would you rate the effectiveness of the management committee in relationship to sustainability of water projects after donor withdrawal?

1. Very effective
2. Effective
3. Ineffective

4. Very ineffective

**(d). Community Participation on sustainability of DFWP**

**20.**Did you or any of your community members participate in the process of site identification, trenching and any in-kind contributions in the water resources?

1. Yes [ ] 2. No [ ]

**21.**How would you rate the level of community participation and involvement in the implementation and after donor withdrawal in water projects in your location? Rate as follows, according to your level best of understanding; **1=Greatly ,2 =Fairly, 3=Low,**

		1	2	3
A	Elections			
B	Meetings			
C	Financial Contribution			

**22.**To what extent would you agree or disagree with the following statement as related to target beneficiaries and community participation on how it influences sustainability of donor water projects? Rate as follows **1=Strongly Agree ,2=Agree ,3=Disagree,4=Strongly disagree (Use four score scales)**

		1	2	3	4
1	The project is fully owned by the target beneficiaries of the project				
2	The community involved in decision making				
3	The water projects are performing to expectations of community				
4	The water projects are serving the intended communities				

**23.**How would you describe the level of commitment of County and community benefiting from the project to ensure its sustainability for water access?

1. Very committed
2. Committed
3. Less committed
4. Not Committed at all

**24.**What has been the effects of withdrawal of donor funding on the sustainability and sustainability of water projects after donor withdrawal in Lorghum location? The water project has

1. Project continued normally
2. Dismal sustainability
3. Technical challenges
4. Governance challenges

**25.**What has been the results of donor funding withdrawal on the sustainability of funded water projects in your location. Please rate as follows; **4:** Excellent, **3:** Good ,**2:** Fair ,**1:** Poor  
**(Tick on the box based on the ranking)**

		1	2	3	4
1	Financial sustainability				
2	Technological challenges				
3	Managerial sustainability/operations of committees				
4	Community participation towards project sustainability				

**(E): Sustainability of DFWP**

**26.**In the following table, please rate the following statements in relationship with factors influencing sustainability of donor water funded projects in Turkwel ward, Lorghum location. Rate as follows; **KEY: 4. Excellent 3: Good 2: Fair 1: Poor**

		1	2	3	4
a	Training of water technicians influence regular water supply and adequate water for the beneficiaries				
b	Technology adoption influences project technical sustainability of donor water funded projects				
c	Governance structures influence project managerial sustainability of the project in provision of adequate water				
d	Community participation influence project efficiency and effectiveness on sustainability of donor water funded projects				

*Thanks for your time*

**APPENDIX III: INTERVIEW SCHEDULE FOR MOW**

I am student from University of Nairobi undertaking a Master of Arts Degree in Project Planning and Management on **Factors influencing sustainability of DFWP in Turkwel Ward, Lorugum Location**. I am therefore requesting you to provide me with information by filling the questionnaire concerning my research work. The response will be treated with utmost privacy and confidentially and data collected will be used for nothing else but education purpose only.

Thank you,  
Yours faithfully,

Abraham Kisang  
**L50/10345/2019.**

1. Your position .....
2. Professional background .....
3. Academic level .....
4. When did you start working in Turkana County? .....
5. According to your experiences, describe to what extent does training of water technicians influence sustainability of donor water funded projects?  
.....
6. What is the influence of technology adoption on sustainability of donor water funded projects?  
.....
7. What is the influence of governance structures on sustainability of donor water funded project?  
.....
8. What is the influence of community participation on sustainability of donor water funded projects?  
.....



**APPENDIX IV: INTERVIEW GUIDE FOR WATER USER ASSOCIATION  
COMMITTEE LORGHUM LOCATION**

My name is Abraham Kisang. I am a student from University of Nairobi, conducting a survey **on factors influencing sustainability of DFWP in Turkwel Ward, Lorugum Location**. I would like to request you to respond to the questions provided in this questionnaire. The information you provide will be used for academic research purposes only and will be treated with the privacy and confidential it deserves. Your response will be highly appreciated

**1.**What is the Name of Water User Association?

**2.**What type of water point does your association manage? hand pump  Blue pump   
Solar powered boreholes  All of the above

**3.** Has the two solar powered boreholes in your area been functioning and serving the beneficiaries to their expectations? Yes  No

**4.**If No what are some of the factors affected the performance of the water projects?

**5.**Has the water user association been trained on operations and Maintenance of water systems?

Yes  No

**6.**Why have you not been trained?

**7.**In your opinion what type of water technology systems suits this ASALs areas? Genset systems  Blue pump  Indian Mark two Pump  Solar powered boreholes

**7.**How do you normally engage the users/community in the Management of water points systems?

**8.**Number of days the water point has been functional and operational in the last 4 years?

Four years  Three years  Two years  One-year  Half -year   
Less than 2 months

**9.**Have you experienced any breakdown since 2015 in the two boreholes? Yes  No

**10.** If Yes what caused the breakdown?

**11.** How did you manage to ensure the water functionality and its operations returned to normalcy?

**12.** On average how many hours do the water points operational in a day? 0-5 hours

6hours -11 hours  12hours -24 hours

**13.** How often do you conduct meetings as a water Users Association? Very Often

Often  Rarely

**14.** How can you rate the level of education of Water Users Association committee? Very

High  Low  High  Very Low

**15.** How can you rate level of sustainability of DFWP in your location

Excellent  Good  Fair  Poor

**16.** Based on the above answers on question (15). Give reason

## APPENDIX V: RESEARCH AUTHORIZATION-NACOSTI



### 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

NACOSTI, Upper Kabete  
Off Waiyaki Way  
P.O. Box 30623-00100  
NAIROBI-KENYA

Ref. No. **NACOSTI/P/19/21767/30418**

Date: **27<sup>th</sup> May, 2019**

Abraham Kisumbat Kisang  
University of Nairobi,  
P.O. Box 30197 – 00100,  
**NAIROBI.**

#### **RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on *“Influence of socio-economic factors on the performance of donor water funded projects in Kenya; a case of Turkwel Ward, Turkana County”* I am pleased to inform you that you have been authorized to undertake research in **Turkana County** for the period ending **23<sup>rd</sup> May, 2020**.

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

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

**DR. STEPHEN K. KIBIRU, PhD.**  
**FOR: DIRECTOR-GENERAL/CEO**

Copy to:

The County Commissioner  
Turkana County.

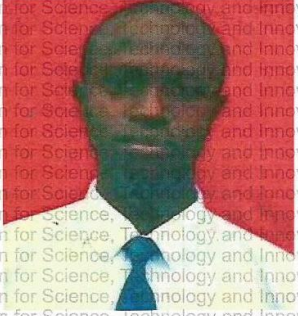

The County Director of Education  
Turkana County.

*National Commission for Science, Technology and Innovation is ISO9001:2008 Certified*




## APPENDIX VI: RESEARCH PERMIT-NACOSTI

**THIS IS TO CERTIFY THAT:** **Permit No. : NACOSTI/P/19/21767/30418**  
**MR. ABRAHAM KISUMBAT KISANG** **Date Of Issue : 27th May,2019**  
**of UNIVERSITY OF NAIROBI , 4380-30200** **Fee Received :Ksh 1000**  
**KITALE,has been permitted to conduct**  
**research in Turkana County**  
**on the topic: INFLUENCE OF**  
**SOCIO-ECONOMIC FACTORS ON THE**  
**PERFORMANCE OF DONOR WATER**  
**FUNDED PROJECTS IN KENYA; A CASE OF**  
**TURKWEL WARD, TURKANA COUNTY**  
**for the period ending:**  
**23rd May,2020**

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

.....  
**Applicant's**  
**Signature**


**THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013**  
**The Grant of Research Licenses is guided by the Science, Technology and Innovation (Research Licensing) Regulations, 2014.**

  
**REPUBLIC OF KENYA**

**CONDITIONS**

1. The License is valid for the proposed research, location and specified period.
2. The License and any rights thereunder are non-transferable.
3. The Licensee shall inform the County Governor before commencement of the research.
4. Excavation, filming and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
5. The License does not give authority to transfer research materials.
6. NACOSTI may monitor and evaluate the licensed research project.
7. The Licensee shall submit one hard copy and upload a soft copy of their final report within one year of completion of the research.
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