FINANCIAL COST MANAGEMENT AND SUSTAINABILITY OF REHABILITATED COMMUNITY WATER DISTRIBUTION PROJECTS IN WAU COUNTY, SOUTH SUDAN

Oyiki Komakech Jackson Cirino.
Masters of Business Administration (Project Management), School of Business and Economics, Kenyatta University, Kenya
Dr. Lydia Gachengo Wanjiku.
School of Business and Economics, Kenyatta University, Kenya

International Academic Journal of Economics and Finance (IAJEF) | ISSN 2518-2366

Received: 9th July 2021

Published: 19th July 2021

Full Length Research

Available Online at: https://iajournals.org/articles/iajef_v3_i7_98_146.pdf

Citation: Cirino, O. K. J., Wanjiku, L. G. (2021). Financial cost management and sustainability of rehabilitated community water distribution projects in Wau County, South Sudan. *International Academic Journal of Economics and Finance, 3(7), 98-146.*

ABSTRACT

In South Sudan, 30-50 % of water facilities are non-functional at any point in time, and only 10 % of the population has access to basic sanitation. Weak water sector governance, limited funding and funding absorption capacity, human resource constraints, and limited data for decision-making are among the major drivers of low water access. The purpose of the study was to investigate financial cost management and sustainability of rehabilitated community water distribution projects in Wau County, South Sudan under four specific objective: To determine the influence of cost estimation, budgeting and cost control on sustainability. Transaction Cost Economics and inter-organizational management control, Community Asset Based Model of Development and Sustainable Water Aid theories were applied in this study. Descriptive research designs supported by quantitative and qualitative data collection approach were used in the study. Quantitative data was gathered from a sample of 42 out of a target of 42 community water management committee persons purposive and census sampling technique using a self-administered questionnaire while qualitative data was collected from 6 chairpersons of the 6 rehabilitated community water distribution project committees using a face to face interview guide. Quantitative data for the objectives were presented using mean and standard deviation. To determine the influence of the dependent variable indicators towards the dependent, the researcher will plot a linear regression table. The qualitative data from key informant was analysed using thematic analysis or narration approach. The study established that cost estimation, budgeting and cost control had a positive and significant influence on sustainability of rehabilitated community water distribution projects of Wau County, South Sudan. On cost estimation, the study concluded that cost estimation enables project managers to set clear expectations with stakeholders. On budgeting, the study concluded that budgeting outlines the financial resources available, which further determines the human resources that are required. On cost control, the study concluded that controlling costs lowers the overall expenses in an organization. On cost estimation, the study recommended that project managers should identify resources that are required, the price of each resource, duration that each resource is required, list of assumptions, potential risks, past project costs and industry benchmarks, if any and insight into the organization's financial health and reporting structures. On budgeting, the study recommended that the project budget should consider cost planning in terms of labour costs, material costs and operating costs. On cost control, the study recommended that the project manager should plan for the project budget to help for all payments that need to be made and costs that will incur during the project life cycle.

INTRODUCTION

Background to the Study

Access to safe water is not only fundamental to good health but also to satisfactory livelihoods, dignity and prospects for economic growth and education (United Nations Economic Commission of Europe [UNECE] & World Health Organization [WHO], 2011). The United Nations (UN) General Assembly Resolution 64/292 of July 2010 declared it as one of Human Rights. The report of the Millennium Development Goal (MDG) of the year 2015 has shown huge disparities in proportion of people without sustainable access to safe drinking water in Sub –Saharan Africa compared to Latin America and the Caribbean, South-Eastern Asia, Southern Asia and Western Asia. In Africa, it is has reported that only 20% gained access to improved water sources (Rose, 2015).

Worldwide, urban dwellers have better access (96%) to improved water sources than rural residents (84%). Unfortunately, 663 million people still use unimproved drinking water sources; nearly half of these live in sub-Saharan Africa, while one-fifth live in South Asia (United Nations Development Programme [UNDP] & Rose, 2015). In Africa, water affects the lives and welfare of close to a billion people. Almost half of the African population falls sick each year through drinking polluted water. Polluted Water is the cause of about 20 deaths in every 100 among the under-5 years and is responsible for the deaths of 20 out of every 1,000 people who die each year in Africa, including more than 1.5 million children from Sub-Saharan Africa. These casualties of cholera and other diarrheal/enteric waterborne diseases far outstrip the number of victims of HIV/AIDS, tuberculosis and malaria put together (The Nordic Africa Institute, 2018).

In South Sudan, 50% of the population lack access to safe water. To survive, families drink dirty water, putting them at risk of waterborne diseases such as cholera and diarrhoea, which remain leading causes of death among children in South Sudan. Poor hygiene practices further aggravates the situation (United Nations Children's Fund [UNICEF] South Sudan, 2011). South Sudan is home to largest incidence to guinea worm in the world that transmits through drinking contaminated and stagnant water (Ministry of Water Resource and Irrigation [MWRI], 2011).

The global Sustainable Development Goal (SDG) set by UN in 2012 provides direction in development in the world after MDG ends in 2015. The sixth goal of SDG is to ensure availability and sustainable management of water and sanitation for all by the year 2030. Under goal 6.1, the target is to achieve universal and equitable access to safe and affordable drinking water for all. Scallon, Cassar and Nemes (2004) noted many non-governmental organizations and national government have spent large amount of resources in initiating water projects especially in rural areas which were managed by communities.

Sustainability

Sustainability is a process of ensuring that a project system and interventions continues to function well and able to generate benefits over time as designed. Sustainability is therefore the ability of a project to continue serving its own intended purpose beyond its set budget by the funder (Rose, 2015).

The industrialized world has recognized its role in aiding the developing world through the provision of clean water. However, in spite of good intentions, water aid has not consistently provided the developing world with lasting and sustainable solutions to their water needs. Since the advent of water aid, its priority on the international agenda has grown with every passing year, culminating with the United Nation's Millennial Development Goals in 2005. However, for as long as water aid has existed, the developed world has systematically failed to provide successful and sustainable water treatment systems to the developing world. Success and sustainability rates for water aid have consistently hovered around 10% to 12%. Countless monies have been inefficiently used for water aid projects like the UN's first water decade, El Cajon dam, the Red Cross Central American water tank program (Ramaswami *et al*,. 2013).

The United States Agency for International Development (USAID) was one of the main agencies that installed water systems for the UN during the first water decade in Asia. In a survey of the USAID water systems that had been installed during the water decade, it was found that by 1995 only 30% of the water systems were still being operated. By 2000, only 12% of the water systems were still being used. These results were not uncommon for other international aid agencies associated with the UN's water decade either. With an average project lifespan of less than 5 years, it is easy to see why the issues of clean water and sanitation have continued to persist (UNDP, 2006).

The Cranfield University (2014) study of numerous community management of water in India has showed that for community management to be successful, a certain level of socioeconomic wealth is necessary, but not sufficient. A Combination of different Plus factors (financial support, technical skill capacity, management skill support, accessibility to spare parts etc), both internal and external, is also needed to make the community management approach sustainable and successful (Cranfield, 2014). Many studies have been done on these plus factors that influence sustainability of community water in India.

In Africa, the percentage of functioning and sustainable water systems in rural areas ranged from 35–80% (Sutton, 2004). In a survey of 7,000 wells and boreholes in Tanzania, on average, 45% were in operation, and only 10% of systems that were 25 years or older were still functioning (Haysom, 2006). A study in South Africa noted that as many as 70% of the boreholes in the Eastern Cape were not functional (Mackintosh and Colvin, 2003).

In Uganda, the Water and Environment Sector Performance Report of 2016 reveals that the average access to safe water in rural areas is estimated at 64% and that access to safe drinking

water in the urban areas currently stands at 71%. The June 2015 report indicates that functionality for rural water supplies has reduced to 86% from 88% (Civil society Budget Advocacy Group, 2017).

In Kenya, access to water stands at 51 percent nationally (UNICEF & WHO, 2012). Both Foreign donors and the national government made large water supply investments to the Kenyan rural people. Studies have shown majority of the new water supplies projects stop functioning few years after construction (MWRI, 2007; and Rural Water Supply Networks, 2007).

In South Sudan, 30-50 percent of water facilities are non-functional at any point in time, and only 10 percent of the population has access to basic sanitation. Weak water sector governance, limited funding and funding absorption capacity, human resource constraints, and limited data for decision-making are among the major drivers of low access rates (Global water South Sudan, 2019). In South Sudan, majority (80%) of the population dwell in rural area yet access to an improved water source in rural areas is at 34% with over 60% of the rural citizens not accessing clean water for domestic use (USAID, 2013). Numbers of development partners such as USAID, EU, World Bank among others in collaboration with Government of South Sudan (GOSS) are providing access to safe water by drilling boreholes. In areas where long-term solutions are needed, UNICEF is trucking fresh water to communities or providing families with purification tablets and powder. UNICEF South Sudan (2019) in its part of capacity building of the water users reported 263 youths (153 male and 110 female) have been trained and engaged in various water, sanitation and hygiene related activities in Bor Protection of Civilian site (POC), Bentiu POC and Wau Internal Displaced Persons (IDPs) camp including host population outside the POC. However, no study has been done on financial cost management and sustainability rehabilitated community water distribution projects specifically in Wau County.

Financial Cost Management

Financial cost management refers to process of planning funds, organizing obtained funds and controlling financial accomplishments to realize the objective of an institute. It includes three important decisions, which are investment decisions, financing decision and dividend decision for a specified duration. Investment decision includes working capital decision and capital budgeting decision (Management Study Guide, 2020).

Investment Financing for South Sudan Water Service depends mostly on external grants. The important external partners in the water sector are Germany, USA, Japan and the World Bank. The latter administered Multi –Donor Trust Fund (MDFT) that created in 2006 (The World Bank, 2013 & Global water intelligence, 2011). The rural water supplied by Basic Service fund (BSF). DFID, the Netherlands, Sweden, Canada, Norway and the European Union finance BSF. Numerous Non-governmental organizations (NGOs) such as Caritas, GOAL, Save the Children among other NGOs led by Water is Basic supports drilling of water in South Sudan (World bank, 2013 & Global water intelligence, 2011).

South Sudan's Ministry of Water Resource and Irrigation Pricing policy for water supply services states that in both rural and urban areas, the cost of managing and supplying services should be gradually introduced to encourage financial sustainability through the application of efficient and effective financial cost management strategies such as budgeting, cost control and cost estimation. Knowledge, Attitudes and Practices (KAP) Survey conducted in South Sudan in 2009 indicates that in general, the Consumers' Willingness to Pay (CWP) as well as to charge is too low and this affects the process of cost estimation and budgeting. The survey shows that only 20% of the population contributed towards operation and maintenance (O&M) of their water supply system. A major contributing factor has been the lack of sufficient community awareness, training and mobilization while implementing rural water supply programs (MWRI – South Sudan, 2011).

Rehabilitated Community Water Distribution Projects in Wau County, South Sudan

South Sudan is having abundant surface and ground water potential but access to water supply services is among the lowest in Africa at 34%. Surveys suggest that an estimated 10,000 water points are available in the rural areas of the country of which 30-50% are non-operational at any time in each state with less than 20% having been rehabilitated by the community members (MWRI, 2011). Over the last few years, a surge in the number of new water points mainly driven by NGOs as emergency measures does not balance with ensuring sustainability and some of the projects end up non-functional within a very short time (African Development Bank Group [AfDB-Group], 2013).

Southern Sudan Health and Household Survey (2010) indicated Wells/boreholes accounts for 65% of the total water supply in the country. Other water supply sources include haffirs (sub-surface dams) and ponds. Only 2% of the country's population has access to piped water supply against an average of 33% for Sub-Saharan African countries (MWRI, 2011) 50.9% of rural population uses hand pump and 25.5% uses surface water and other sources. Only 5.8% have access to public tap/stand pipe. Lack of capacity to operate and maintain the facilities and shortage of spare parts have contributed to mal-functioning of most of the facilities. Donors such as the World Bank through MDTF (2007) and USAID (2009) funded the rehabilitation of the dilapidated water source.

Wau County is located in Western Bahr Ghazel, Northwest of Juba capital city of South Sudan. In Wau county, the International Committee of the Red Cross [ICRC] (2016) rehabilitated community water distribution projects broken water yards and their kiosks and added a solar panel system at the water yards to reduce running cost of the systems, which were initially, ran by generators. At some locations, new water yards and water kiosks constructed to meet increasing returnees population. The water yards are located at six zones of Wau County namely Hai Kosti, Hai Nasira, Hai Jebel Kire, Hai Lokoloko, Hai Matamdia and Hai Bilpam. Each water yard is made of 4 to 6 water kiosks and 4 taps per kiosk. The water system is managed by 7 members committee at each water yard. People especially women and girls used to walk for between three-five kilometres and wait for hours in long queues to fetch water as some of the water kiosks are broken down. Despite the intervention

by CBO and ICRC, the community water distribution projects in Wau County still experience problems and dissatisfaction among the beneficiaries. There is no current empirical information showing how financial cost management affects the sustainability of community rehabilitated water distribution projects, it is very vital to carry out this study and investigate the influence of financial cost management on sustainability of rehabilitated community water distribution projects in Wau County, South Sudan.

Statement of the Problem

In South Sudan, 30-50 % of water facilities are non-functional at any point in time, and only 10 % of the population has access to basic sanitation. Weak water sector governance, limited funding and funding absorption capacity, human resource constraints, and limited data for decision-making are among the major drivers of low water access (Global water South Sudan, 2019). South Sudan's Ministry of Water Resource and Irrigation Pricing policy (2019) for water supply services states that in both rural and urban areas, the cost of managing and supplying services should be gradually introduced to encourage financial sustainability. KAP Survey conducted in South Sudan in 2009 indicates that in general, the Consumers' Willingness to Pay (CWP) as well as to charge is too low. The survey shows that only 20% of the population contributed towards operation and maintenance (O&M) of their water supply system. A major contributing factor has been the lack of sufficient community awareness, training and mobilization while implementing rural water supply programs (MWRI– South Sudan 2011).

In Wau County of Western Bahr Ghazel, only 5 out of the 12 water kiosks out for the 3 water yards community water distribution constructed in 2012 were functional while the rest were damaged in 2015. Some of the water kiosk in Wau County are experiencing leakage due to broken taps, leaking tanks (ICRC, 2016) hence people especially women and girls walk for between three-five kilometres and wait for hours in long queues to fetch water. Also increasing returnee population have added pressure to the existing water system. To mitigate this problem, ICRC (2016) rehabilitated the broken water yards and their kiosks and added a solar panel system at the water yards to reduce running cost of the systems, which were initially, ran by generators. At some locations, new water yards and water kiosks constructed to meet increasing returnees population. Community Water Management Committee (CWMI) with constituted Bylaws formed to manage the water system as part of sustainability of rehabilitated community water distribution projects in the County. Despite the intervention by CWMI and ICRI community water distribution projects in Wau County still experience problems related to short lifecycle, negative outcome demonstrated by increased cases of water borne diseases since people are forced to use untreated stream water, long distance walk to fetch water among the people as well as expression of dissatisfaction among the beneficiaries. Currently, the community has taken the initiative of managing the water kiosks. This creates senses of ownership of the project from on set and after financial discontinue by funding agencies (ICRC 2017). However, the issue of financial cost management is so critical in the sustainability of rehabilitated community water distribution projects because budgeting, cost estimation and cost control when not well addressed leads to low level of

sustainability (Management Study Guide, 2020), same as what is experienced in Wau County. Nevertheless, there is no current empirical information showing how financial cost management affects the sustainability of rehabilitated community water distribution projects, it was very vital to carry out this study and investigate the influence of financial cost management on sustainability of rehabilitated community water distribution projects in Wau County, South Sudan.

Objectives of the Study

General Objective

The overall objective of the study was to investigate the influence of financial cost management on sustainability of rehabilitated community water distribution projects in Wau County, South Sudan and hence come up with measures to promote sustainability of rehabilitated community water distribution projects of Wau County, South Sudan

Specific Objective

i. To determine the influence of cost estimation on sustainability of rehabilitated community water distribution projects of Wau County, South Sudan.
ii. To determine the influence of budgeting on sustainability of rehabilitated community water distribution projects of Wau County, South Sudan.
iii. To determine the influence of cost control on sustainability of rehabilitated community water distribution projects of Wau County, South Sudan.
iv. To come up with measures to promote sustainability of rehabilitated community water distribution projects of Wau County, South Sudan

Research Questions

The following questions guided the research:

i. What is the influence of cost estimation on sustainability of rehabilitated community water distribution projects of Wau County, South Sudan?
ii. What is the influence of budgeting on sustainability of rehabilitated community water distribution projects of Wau County, South Sudan?
iii. What is the influence of cost control on sustainability of rehabilitated community water distribution projects of Wau County, South Sudan?
iv. What are the suitable measures to promote sustainability of rehabilitated community water distribution projects of Wau County, South Sudan?

Significance of the Study

This study would enable community to develop creative ideas on financial cost management that will help them budget, estimate cost and cost control in the sustainability of rehabilitated community water distribution projects. With such ideas, the community would be able to have continuous water supply.

The study findings would add on the literature review useful by other researchers, scholars, academicians and students interested in the study content in future. Thus, the findings would be used as literature or citations in future studies.

The study findings would be the basis for government policies or laws aimed at promoting sustainability of community water management projects. Thus, the government and other policy makers would be able to come up with policies based on the findings of this study.

Scope of the Study

The study focused on Community Water Distribution Projects in Wau County-Western Bahr Ghazel, located Northwest of Juba capital city of South Sudan. The study aimed at assessing the influence of financial cost management (independent variable) indicated by cost estimation, cost budgeting and cost control) on sustainability of rehabilitated community water distribution (dependent variable) indicated by project lifecycle, beneficiary satisfaction and outcome in Wau County, South Sudan. The study covered a period of 12 months, which is from January 2020 to December 2020.

Limitations of the Study

The limitation of the study is language barrier and illiteracy of the community. Convey of information in the questionnaire to community members through translation may be misinterpreted. This could affect outcome of the study. This was sorted by enlisting the interpreters, using plain language, using repetition and be respectful.

Possibility of missing the target community members as they may be engaged in their farms, which are at far distance from homestead or Wau centers. Early communication and setting different dates for interview of different zones of the water kiosks shall sort the issue. Also conducting the interview preferably in the evening when most farmers are back in their residence.

The civil war traumatized the people of South Sudan. The security personnel and the local have mistrust for interview of the community especially in regards to established infrastructure. This may raise many questions and delay the interview exercise. Early sensitization of the concern authorities and assurance of the information collected are for the studies purpose shall sort the issue through the university introduction letter.

Organization of the Study

This study proposal comprises of background of the study, statement of the problem, objectives of the study (general objectives & specific objectives), research questions, and significance of the study, scope of the study, significance and limitations of the study.

It also contains the literature review on the various variables starting with the review of theoretical literature, empirical literature regarding project costs, financial cost management (independent variable) comprising of cost estimation, cost budgeting, and cost control. The dependent variable is sustainability.

Finally, it covers the study methodology comprising of research design, target population, sampling design (sample size and sampling procedures), data collection instrument (self-administered questionnaire, interview guide for the key informants, validity and reliability of the instrument) data collection procedures, and data analysis and presentation.

LITERATURE REVIEW

Introduction

This chapter contains literature review on financial cost management and sustainability rehabilitated community water distribution projects. Source of the literature is published journals, articles, reports and internet sources. Aim of the literature is to review the views of other researchers and scholars in relation to the study content as well as to identify the study gaps.

Theoretical Literature Review

Community Asset Based Model of Development

Asset Based Community Development (ABCD) is an approach to sustainable community-driven development. Beyond the mobilisation of a particular community, it is concerned with how to link micro-assets to the macro-environment. Asset Based Community Development's premise is that communities can drive the development process themselves by identifying and mobilizing existing, but often unrecognised assets. Thereby responding to challenges and creating local social improvement and economic development. Asset-based Community Development (ABCD), or asset-based community-driven development as it is sometimes called, is a bottom-up way of working with communities that focuses on community strengths and assets rather than on deficits and problems.

ABCD focuses on the half-full glass (Kretzmann, 2010). The half-empty glass represents the notion that communities are deficient and have many needs. The half-full glass represents the notion that communities (and the people who live there) have many strengths, capabilities and assets. It is the half-full glass that gives us something to work with.

ABCD is usually called asset-based community development, but a few authors prefer asset-based community-driven development (Peter, 2013) or asset-based citizen-led development (Mathie, Cameron, & Gibson, 2017) to emphasise that ABCD is driven by the community not external agencies. While professionals (or external catalysts) can play an important role, their focus should be on assisting communities to drive their own development. This theory is

suitable in this study since it is addressing the empowerment of the community to ensure that community projects are well developed and sustained.

Transaction Cost Economics and inter-organisational management control theory

Transaction Cost Economics (TCE) theory provide basic theoretical insights indicating the influence of financial cost management towards the success in project sustainability (Oliver, 1993). This theory emerged from Coase's explanation of the origin of the firm, and found purchase in Williamson's articulation of the idea that organizational forms exist to economise on transaction costs (Coase, 1937; Williamson, 1975, 1985). It suggest that the optimum organisational structure is one that achieves economic efficiency by minimizing the costs of exchange. (Williamson 1979, 1986).

To translate relevant conceptions and propositions of Transaction Cost Economics into operational definitions, the research conceptualizes and breaks down transaction costs of community projects into three cost elements, i.e. set-up costs, monitoring costs and enforcement costs. Transaction attributes in community projects operationalization. Building on inter-organizational management control theory, the research categorises the control mechanisms in community projects as outcome, behavior and social controls. In addition, financial cost management in alliances refers to contracting parties' coordinated efforts to reduce shared costs adopted to control community project operations and improve the efficiency and effectiveness of community projects.

Laurenceau, Destandau & Rozan (2009) using the TEC theory assess integrated water policy performance, pollution abatement costs weighed against overall policy implementation costs. Transaction costs used to explain governance structures. Governance structures keeps transaction costs low and thereby optimize performance. It is noted that administration, monitoring and other transaction costs are in most cases not included in costs estimation. This resulting in higher ex post than ex ante costs of public investment decisions.

Carlson and Bitsch (2019) applied TCE to understand Organizational Structures in Solidarity-Based Food Systems (SFS) by name Solidarische Landwirtschaft (Solawi) in Germany formed under. SFS are designed to protect producers from market pressures and ease consumers' mistrust in market-based mechanisms. The SFS was based on relationships of mutual trust, dependency and support between consumers and producers. The article suggests TCE as helpful to gain a better understanding of how these organizations form and function. Qualitative research methods; observation and in-depth interviews with Solawi participants and consultants from the Solawi network were conducted which is used create comprehensive accounts of the governance structures of four Solawis and the reasons behind the decisions of individual actors to participate. The Success of TCE in evaluating these structures is analyzed. Based on the outcomes, the concept of transaction benefits is suggested as a potential augmentation of TCE to improve its applicability to SFS.

Theory of Sustainable Water Aid

The theory of sustainable water aid gives facts about the failure of projects done through government or non-governmental aid to the community due to mismanagement of funds (aid) in developing countries despite the fact that lack of accessibility to safe water has always been one of the greatest challenges to the rural developing world. This issue has resulted in the deaths of countless millions of people, as well as the underdevelopment of many nations. The developed world has always recognized the necessity of providing water aid to these developing nations. However, this water aid has had limited success in providing sustainable water solutions and in alleviating this crisis. Recognizing this lack of effectiveness, the theories of water aid and community development have been studied and scrutinized.

Different researchers have applied the theory of sustainable water aid. For instance, Honduras (2010) took great care in following the principles of proper international water development based on the theory of water aid and realized that the level of financial cost management determines the level of sustainability of community water distribution projects. Therefore, since the theory addressed sustainability of water projects in community of Colinas de Suiza, it is applicable in investigating financial cost management and sustainability rehabilitated community water distribution projectss in Wau County.

In addition, Ramaswami et al (2013) applied the water aid theory and stresses the importance of community participation when he says, “Participatory planning builds local trust and independence.” Asano and Burton,. et al (2007) draws a direct connection between the sustainability of water aid and participation when he says, “The effectiveness (of projects) is increased if…the people on the receiving end of new technology and other programs are enfranchised in the process.”

Empirical Literature Review

Cost Estimation and Sustainability of rehabilitated community water distribution projects

Estimation of Water Distribution Cost

Rodríguez-Miranda (2015) investigated the costs of installation of various technologies of wastewater treatment plants in Cundinamarca, characterizing each one of them and obtaining investment cost functions for each one, when doing an investigation of the existing projects in the area. McGivney and Kawamura (2008) researched installation and operating costs of various water treatment technologies, including drinking water and wastewater treatment technologies. Both studies found out that estimation of water distribution cost is important in achieving the required level of community water-distribution project sustainability.

According to McGivney and Kawamura (2018), the investment cost is considered to be separate from the construction cost, and they are analyzed from two different perspectives.

Following this approach, the study by McGivney and Kawamura (2018) chose to focus the economic analysis on the estimation of operating costs whereby it was indicated that estimation of operation cost is of great help towards achieving the required project sustainability. In another study, Gratziou and Chrisochoidou (2016) estimated the costs of water treatment plants with the help of statistical methods and analyses whereby it was suggested that estimation of water treatment cost is vital towards community water project sustainability.

Estimation of breakage/leakage Cost

Cost estimate towards possible breakages and leakages of water projects plays a significant role in the success of any community water projects. All parties involved in the construction of a project; owners, contractors, and donors are in need of reliable information about the cost in the early stages of the project, where very limited drawings and details are available during this stage. For instance, in a cross-sectional study by Abdal-Hadi (2010) using a questionnaire as tool of data collection shows that cost estimation has a direct positive significant relationship with the sustainability rehabilitated community water distribution projects at a correlational coefficient of 0.715. However, since the literature does not show the situation in the study area, it is the aim of this study to evaluate how cost estimation influences community water project sustainability in Wau County.

Estimation of repair-charges

Cost estimating involves preparation of estimate for the costs of the resources needed to complete or repair water project activities. Cost estimating differs from pricing. Cost estimating is an assessment of the likely quantitative result, how much it will cost the performing organization to provide or repair the product involved. Pricing is a business decision as to how much the performing organization will charge for the product or service that uses the cost estimate. Thus, cost estimating is one of the most important functions of a successful project. Accurate estimates optimize good contracting as well as the process of calculating and analyzing all the costs that will enter into a particular job to arrive at a set total (Barzandeh, 2011). For instance, in a study by Biniyam (2015) assesses factors affecting the accuracy of cost estimation and analyzes their effect on project management in water works design and supervision enterprise. The discussed objective was the implications of errors in cost estimation. The financial & physical performance report of large-scale projects reviewed in order to assess to what level of accuracy the cost estimation is. Then the data collected through questioner are analyzed and interpreted. The findings have indicated most of the estimated cost of the projects is either under-utilized or over utilized which shows there is undeniable inaccuracies in the cost estimation. However, it is the aim of this study to evaluate how cost estimation influences community water project sustainability in Wau County.

Cost Budgeting and Sustainability rehabilitated community water distribution projects

Cost budgeting involves allocating the overall cost estimates to individual work items in order to establish a cost baseline for measuring project performance and for cost controlling. However, in developing countries, 60% of project management professionals appear to lack knowledge (Mousa, 2015) that the projects completed on time, within budget, and meeting quality requirements represent the critical success factors to ensure successful completion and future sustainability (Drury-Grogan, 2014). In Africa, 87% of all community water projects have experienced time overruns despite having high cost budget compared to community water projects in South America (Ngacho & Das, 2014). It is evident that cost budgeting affects sustainability of community projects but it is not indicated on how cost budgeting is carried out and how it influences sustainability rehabilitated community water distribution projectss in Wau County.

Fixed Cost

Fixed costs are predetermined expenses that remain the same throughout a specific period (Agndal, & Nilsson, 2009). These overhead costs do not vary with output or how the business is performing. To determine your fixed costs, consider the expenses you would incur if you temporarily closed your business (Agndal, & Nilsson, 2009). You would still continue to pay for rent, insurance and other overhead expenses. In relation to fixed cost in community water projects, security expenses are the common costs which the committee has to pay even when the project is not functional (Turner, 2009).

Cost represents the budget and resources of the project. The scheduling of the fixed expenditure bound project cost budget. Barnes proposed the iron triangle as cited by Carvalho & Rabechini (2015) as consisting of time, cost, and scope or quality as a useful model to illustrate the consequences of change to key project stakeholders. Project cost budget is vital for the success and future sustainability of any community based project (Davis, 2014). Based on the literature by Carvalho & Rabechini (2015), it is evident that cost budgeting is an indicator of financial cost management and it influences sustainability of community projects. However, the literature does not indicate if cost budgeting affects sustainability of rehabilitated community water projects.

Variable Cost

In relation to community water projects, variable costs change directly with the water supply output provided or achieved to the community and when output is zero, the variable cost will be zero (De Vita, Tekaya, & Wang, 2010). The total variable cost to a water project is a great determinate of the level of sustainability of any community water project. A common example of variable costs associated with community water projects includes project operational expenses that may increase or decrease based on the functionality of the water project (Caglio & Ditillo, 2008).

Actual cost

It has been suggested recently that water and sewage utilities move to 'full cost' accounting as a means of addressing some of the challenges facing them. A paper by Renzetti and Joseph K (2017) consider what is meant by actual cost accounting for water projects, and examine the operations of the Regional Municipality of Niagara, a typical municipality in Ontario, to determine the extent to which current actual cost of water project understate the full sustainability of water supply services. In the case of the Niagara Region utility, the study estimate that the annual unaccounted actual costs were between $10 and $35 million in 1998 and it affected the level of water project sustainability. This estimated range compares to a combined annual operating budget for the water and wastewater facilities of $64 million. Thus, the study results indicate that the cost of water supply and sewage treatment is substantially understated by a factor of 16%–55%.

Forecast Cost

Despite the success of recent efforts to increase access to improved water, sanitation, and hygiene (WASH) globally, approximately one-third of community schools around the world still lack adequate WASH services due to poor cost forecasting budgeting by governments and non-governmental organizations in matters related to provision of water especially in rural areas (Olukanni, 2013). Thus, inadequate financing and budgeting is a key barrier for integrating successful and sustainable WASH programs into community school settings (World Health Organization, 2014). The literature does not indicate whether and how cost budgeting affects sustainability of rehabilitated community water projects.

Cost Control and Sustainability rehabilitated community water distribution projects Savings

Community contributions such as user fees, household investments, community-based savings and cost sharing are a major source for financing sustainable sanitation and water management products and services. These contributions are important, because sanitation and water systems will only be improved if community members are interested and willing to invest accordingly. The basic objective of a community saving group is to encourage and create a saving culture in the community which helps in sustaining community based projects like community boreholes, dams and other water related projects. Thereby, economic security is increased and financial services are brought closer to community water management committees hence making it easy for them to provide continuous water supply services to the community members (Brown, 2002).

Cost Reduction

According to Young Hoonk Wak and Williams Ibbs (2002), 'Cost control is the process of reducing the cost on a project at all stages from initiation to completion, within the approved budget. Cost control is crucial because cost overruns are common resulting in serious cost

problems during project execution leading to project failure and inability to be sustainable. Thus, in a study by Samiaah and Bassam (2018) which aims to associate project management success (PMS) with cost of control (COC) activities in an empirical manner indicates that there is a significant association between cost control and water project sustainability in Africa. Young Hoonk Wak and Williams Ibbs (2002) together with Samiaah and Bassam (2018) show how cost control affects the sustainability of water projects in Africa. However, the literature is addressing a wide African situation but not specifically about Wau County.

Cost Avoidance

In a study by Abdelsalam and Gad (2009) with the purpose to determine, the extent to which COC activities affect project sustainability indicated that cost avoidance influences the quality and sustainability rehabilitated community water distribution projectss. The study used quantitative method to collect data from Malaysian water companies using postal and email surveys. Hypothesis through correlation and simple linear regression analysis used. The findings of this study indicate that COC activities are positively associated with sustainability rehabilitated community water distribution projectss. The empirical evidences obtained from this research, provides financial justification for all quality improvement efforts. This can assist water companies to enhance the success of project management by reducing the level of project failures due to poor quality, cost overruns, and delays. Abdelsalam and Gad (2009) show how cost control affects the sustainability of water projects in Malaysia but not in Wau County.

Sustainability of Rehabilitated Community Water Distribution Projects

Project lifecycle

Many researchers discussed the orientation of sustainability in the field of the project management (Gareis et al., 2013 and Silvius et al., 2012). The orientation of sustainability is linked to the project lifecycle and has some limitations towards the projects of short duration. The project lifecycle is always integrated with the product or deliverable which is developed from the project (Labuschagne & Brent, 2006), so while finding the sustainability in project life cycle, the deliverable lifecycle and final product life cycle must also be considered (Labuschagne & Brent, 2006). A general discussion on sustainable project management after consideration of project sustainability, deliverables, and its effect was presented by the Silvius and Schipper (2014).

There are several cases where community water projects in Africa have fallen out of service within a limited period after creation (Harvey and Reed, 2004). Most of these projects are without a long-term operation strategy (Franks, 2006). Africa recorded a 45% rural water coverage in 2000 when compared with 40% in 1990, still leaving 237 million people not supplied with water (WHO/UNICEF, 2000). Urban water coverage in Africa recorded at 85% in 2000, with 37 million people urban dwellers not supplied with water. In Nigeria, the

percentage of rural water coverage in 2000 was 40% and urban 60% as compared to 37% rural and 83% urban in 1999 (ADI, 2004). In this context, it is very clear that the rural communities are lagging significantly behind urban areas in water provision. According to Lockwood (2004), Harvey and Reed (2004), the hand pump is appropriate technology because of its low cost, easy to operate and maintain. The financial implication to the community and the donor, recurrent costs are low. The financial responsibility for the on-going O&M of water supply systems falls within the users' community; .the technical skills, tools, and spare parts required for the O&M is available; also, the availability of shallow groundwater resources beneath the earth surfaces in the developing countries makes it a most viable option for community rural water supply. However, other technology options exist such as protected springs; hand pump equipped boreholes on wells; rainwater harvesting; hand-dug wells; gravity fed system and semi-scale pumped systems for rural water supply. This therefore calls for this study to verify the level of sustainability rehabilitated community water distribution projects in Wau County.

Beneficiary Satisfaction

Stakeholder's involvement and participation in projects are significant from sustainability in projects point of view since to promote their level of satisfaction. The appropriate consideration for stakeholder's interest in projects supports in bilateral communication in the project management and further leads to overall stakeholder management and satisfaction (Silvius & Schipper, 2014). The management should strive to involve, motivate and promote the stakeholder's participation in their projects. The stakeholder's participation must reflect the all project management procedures being performed (Silvius & Schipper, 2014).

Active stakeholder involvement is one of the basic pre-requisite for the sustainability of project management (ISO, 2010). Effective stakeholder's involvement requires a bilateral and open communication, development of common agenda among all stakeholders. The stakeholders as partners can identify the problematic area in the project and together can develop solutions to identified problems. The stakeholders can implement solutions and further gauge the progress of the projects (Goedknegt & Silvius, 2012). A need to involve stakeholders in the decision-making process for sustainable project management was also identified by Eskerod and Huemann (2013).

The study by Paulinus and Iyenemi (2014) reviews the sustainability issues that are associated with rural community water provision and some of the challenges experienced in the in Niger Delta region of Nigeria within the context of project benefits sustenance. Several rural communities in Nigeria derive water supply through hand pump operated water supply wells contributing to high level of beneficiary satisfaction. Sustainability of water provision was determined using a qualitative research methodology and undertaking a comparative review of Micro-Projects Programme (MPP3) in Nigeria with that of Volta Region Community Water Supply Programme (VRCWSP), in Ghana. The findings reveal the absence of sustainability in the current approach and the paper recommends that if community based hand pump operated rural water supply projects are to be sustainable; the

sustainability factors given full consideration in its design and implementation. The use of a community based and community driven project-management options in the management of community rural water supply proposed as this remains a credible alternative over control by external or government agencies. The literature is about Niger Delta region of Nigeria but not in Wau County yet this study aims to address the issues of sustainability of rehabilitated community water projects in Wau County.

This study by Franks (2006) reviewed the sustainability issues using a project management approach in order to provide a more sustainable strategy for managing hand pump operated water supply projects and achieving the required level of water supply and community satisfaction. It assesses whether there is the need to adopt a dynamic process that will promote sustainable management of a project's benefits. The rationale centers on the assertion that community rural water supply consisting of hand pump, operated shallow wells are suitable technology for water supply in low-income (rural) communities of Niger delta.

Water sector has been undergoing various reforms in the past decade aimed at promoting projects sustainability. There is a general acceptance that community project participation influences project performance as indicated by their level of satisfaction. However, the influence of participation in decision making on sustainability rehabilitated community water distribution projectss is not clear and affects the level of beneficiary satisfaction. The study established a significant independent influence at ($p< 0.000$) of community participation leading to higher rate of beneficiary or community satisfaction in the community water supply services. The increasing strength of participation from weak, moderate to strong positively correlated to the level of project sustainability realized. To guarantee project sustainability the study recommends that community projects ensure project beneficiaries are involved in all the stages of the project implementation and management. The literature explains the situation regarding sustainability of water projects in three sub counties of Nyeri County, Tetu, Mathira and Nyeri central not in Wau County. This calls for this study to evaluate sustainability rehabilitated community water distribution projectss specifically in Wau County.

Outcome

A WHO (2000) study reveals that the costs of operation and maintenance of rope hand pump in Nicaragua is only US$10 per year as in contrast with the India Mark II of US$59-107 per year. Water tariff is a means of recurrent costs recovery from the hand pump used for the annual operation and maintenance as in the case of Ghana (Harvey, Jawara, and Reed, 2002). An understanding of the real costs of operation and maintenance of hand-pump water project is important in terms of reducing water borne diseases as well as promoting the living condition of the people; but usually neglected.

The study by Papke-Shields et al., (2010) aims to find the sustainability of community water supply with reference to Nepal. The literature survey method adopted for the study. The study found that water is an essential resource for survival and secure good health. However,

people around the world are facing the problems of water scarcity. This scarcity of water forced the people to use unsafe water for the drinking and other domestic purposes. In developing countries including Nepal, 25 % of water supply projects are being defunct within two years of their construction. The major problems related to socio-technical, management, financial, as well as community level are experienced. People's participation from planning to operation and maintenance phase is necessary. Similarly, the strong and capable users' committee formed for the sustainability of the community water supply projects. Sustainable development viewed as maintenance of a positive rate of improvement. Repair and rehabilitation of the systems are required to meet changing demands and conditions. Support for social capital building, active communication by local leaders with community members regarding the planning and operation of water system are important factors for the sustainable development of community water supply system. In addition to social factors, administrative, financial and technical aspects are essential for sustainable rural water supply systems to ensure the effectiveness of system over time and at reasonable cost. The literature is about the situation in Nepal and it does not show sustainability rehabilitated community water distribution projects in Wau County. This calls for this study to evaluate sustainability rehabilitated community water distribution projects specifically in Wau County.

Harvey and Reed (2004), Parry-Jones et al. (2001) suggest that, since the capital costs of hand pump operated water supply projects are huge and the community or individual cannot afford it, the responsibility left for the government, donors or NGOs. However, Parry-Jones et al (2001) suggest that even though such concern should be carried by the project financier, the community must prove commitment either in-cash or in-kind but at most times in-kind and further concludes that it is through this commitment that community could have concern for the project and the organizational capacity to sustain it. However, an evaluation of a UNCDF project in Guinea Bissau indicates that the failure of hand pump operated projects and other projects was the failure to develop an appropriate strategy for operation and maintenance (O&M) cost recovery at the community level then undermines the sustenance of the projects benefits. The literature does not show how financial cost management affects sustainability rehabilitated community water distribution projectss in Wau County. This calls for this study to evaluate sustainability rehabilitated community water distribution projects specifically in Wau County.

Measures to Achieve Sustainability

The sustainable project management can be achieved by taking appropriate measures towards it. Some procedure is identified from Papke-Shields et al., (2010) literature namely stage-gate process and the iron triangle approaches. Kerzner (2009) identified the stage-gate process as one of the core element in the project management. The conventional controlling procedures were found to be less effective in the management of projects. To overcome this, the stage gate process was developed. The stage gate process was found to promote, help and support in implementing the effective control measures.

In the stage-gate, the gates represent the controlling decision points (Kerzner, 2009). The gates are applied to seek to go- ahead for the actions and also facilitate in early detection of losses into the projects so that resources can be judiciously utilized in the appropriate way. Another widely applied approach for appropriate selection of measures in project management is iron triangle (Papke-Shields et al., 2010; Atkinson, 1999). The iron-triangle represents triple constraint namely time, quality and cost. The stage gate approach also gauges a project success on time, quality, uncertainty, and cost parameters (Project Management Institute, 2013).

Summary of Literature Gaps

Different researchers and scholars have given their views regarding financial cost management and sustainability of water projects in different parts of the world but their literature is not basically addressing financial cost management indicators targeted in this study such as cost estimation, cost budgeting and cost control on how they influence sustainability of rehabilitated community water projects.

Table 2.1: Previous Studies and Knowledge Gap

Author	Focus of Study	Key Findings	Knowledge Gaps	Focus of the Current Study
Rodríguez-Miranda (2015)	Investigated the costs of installation of various technologies of wastewater treatment plants in Cundinamarca.	Realized that investment cost functions for each water project affected the functionality of the project.	The study focused more on investment cost.	The focus of the current study is to investigate the influence of water distribution cost sustainability of rehabilitated community water projects.
McGivney and Kawamura (2008)	Researched installation and operating costs of various water treatment technologies, including drinking water and wastewater treatment technologies.	Found out that estimation of water distribution cost is important in achieving the required level of community water-distribution project sustainability	The study focused more on water treatment technologies but not on sustainability of rehabilitated community water projects.	It is the intention of this study to find out the influence of cost estimation on sustainability of rehabilitated community water projects.
Chrisochoidou (2016)	Estimated the costs of water treatment plants	Realized that estimation of water treatment cost is vital towards	The study addressed water treatment project but not on rehabilitated	To find out how estimation of water distribution cost influences

		community water project sustainability.	community water projects	sustainability of rehabilitated community water project
Abdal-Hadi (2010)	Cost estimation and sustainability of rural water projects	Findings shows that cost estimation has a direct positive significant relationship with the sustainability of water projects	The study addressed rural water project sustainability but not rehabilitated community water distribution projects	This study aims to address estimation of breakage/leakage Cost and sustainability of rehabilitated community water distribution projects.
Biniyam (2015)	Factors affecting the accuracy of cost estimation	The findings have indicated most of the estimated cost of the projects is either under-utilized or over utilized.	The study focused more on cost estimation utilization but not on cost estimation of breakage/leakage of rehabilitated community water distribution projects.	This study aimed at addressing the issue of cost estimation of breakage/leakage of rehabilitated community water distribution projects.
Ngacho & Das, 2014	Cost budgeting and community water projects performance	In Africa, 87% of all community water projects have experienced time overruns despite having high cost budget compared to community water projects in South America	The study addressed the situation in the entire Africa in comparison to South America but it did not specify whether the same was happening in rehabilitated community water distribution projects in South Sudan.	Aim of this study is to address cost estimation of breakage and leakage of rehabilitated community water distribution projects specifically in Wau Couty.
Davis, 2014	Project cost budget, success and future sustainability of community based project	Project cost budget is vital for the success and future sustainability of any community based project	The literature does not specify the type of community project yet this study is specifically	The focus of the current study is to find out the influence of fixed cost budgeting on the sustainability of

			addressing rehabilitated community water distribution projects.	rehabilitated community water distribution projects.
De Vita, Tekaya, & Wang (2010), and Caglio & Ditillo, (2008)	Variable cost in management of water projects	In relation to community water projects, variable costs change directly with the water supply output provided or achieved to the community and when output is zero, the variable cost will be zero	The literature is on water project but not specifically on variable cost and rehabilitated water projects.	Focus of the current study is to evaluate the influence of variable cost budgeting on sustainability of rehabilitated community water distribution projects.
Renzetti and Joseph K (2017)	Actual cost of water project and sustainability of water supply services	The study results indicate that the cost of water supply and sewage treatment is substantially understated by a factor of 16%–55%.	The study is addressing water supply and sewage treatment is substantially but not actual cost and sustainability of rehabilitated water projects.	To evaluate the influence of actual cost on the sustainability of rehabilitated community water distribution projects.
Olukanni, (2013)	Cost forecasting budgeting by governments and non-governmental organizations in matters related to provision of water especially in rural areas	Inadequate financing and budgeting is a key barrier for integrating successful and sustainable WASH programs into community school settings	The literature setting was for school water projects but not rehabilitated community water distribution projects.	Focus of this study is to evaluate the influence of forecastl cost on the sustainability of rehabilitated community water distribution projects.
Brown (2002)	Community contributions such as user fees, household investments, community-based savings and cost	The basic objective of a community saving group is to encourage and create a saving culture in the	The literature was on community saving and sustainability of boreholes, dams and other water related projects	This current study seeks to investigate community savings on sustainability of rehabilitated community

	sharing	community which helps in sustaining community based projects like community boreholes, dams and other water related projects	but not specifically onsustainability of rehabilitated community water distribution projects.	water distribution projects.
Young Hoonk Wak and Williams Ibbs (2002)	Cost reducing on project stages within the approved budget	Cost control is crucial because cost overruns are common resulting in serious cost problems during project execution leading to project failure and inability to be sustainable	The literature was on cost reduction during different stages of project development yet this study is on rehabilitated community water projects.	This current study aims at evaluating cost control and its influence on sustainability of rehabilitated community water distribution projects.
Young Hoonk Wak and Williams Ibbs (2002) together with Samiaah and Bassam (2018)	Cost control and sustainability of water projects in Africa	Cost control affects the sustainability of water projects in Africa	The literature is on the situation in Africa but not on sustainability of rehabilitated community water distribution projects.	The current study is on cost control and sustainability of rehabilitated community water distribution projects.
Abdelsalam and Gad (2009)	The extent to which COC activities affect project sustainability	The findings of this study indicate that COC activities are positively associated with sustainability of rehabilitated community water distribution projects	The literature does not specify the geographical scope and hence calling for a study of the kind to be carried out in South Sudan.	The current study is on how cost avoidance influences sustainability of rehabilitated community water distribution projects.

Conceptual Framework

Independent Variables

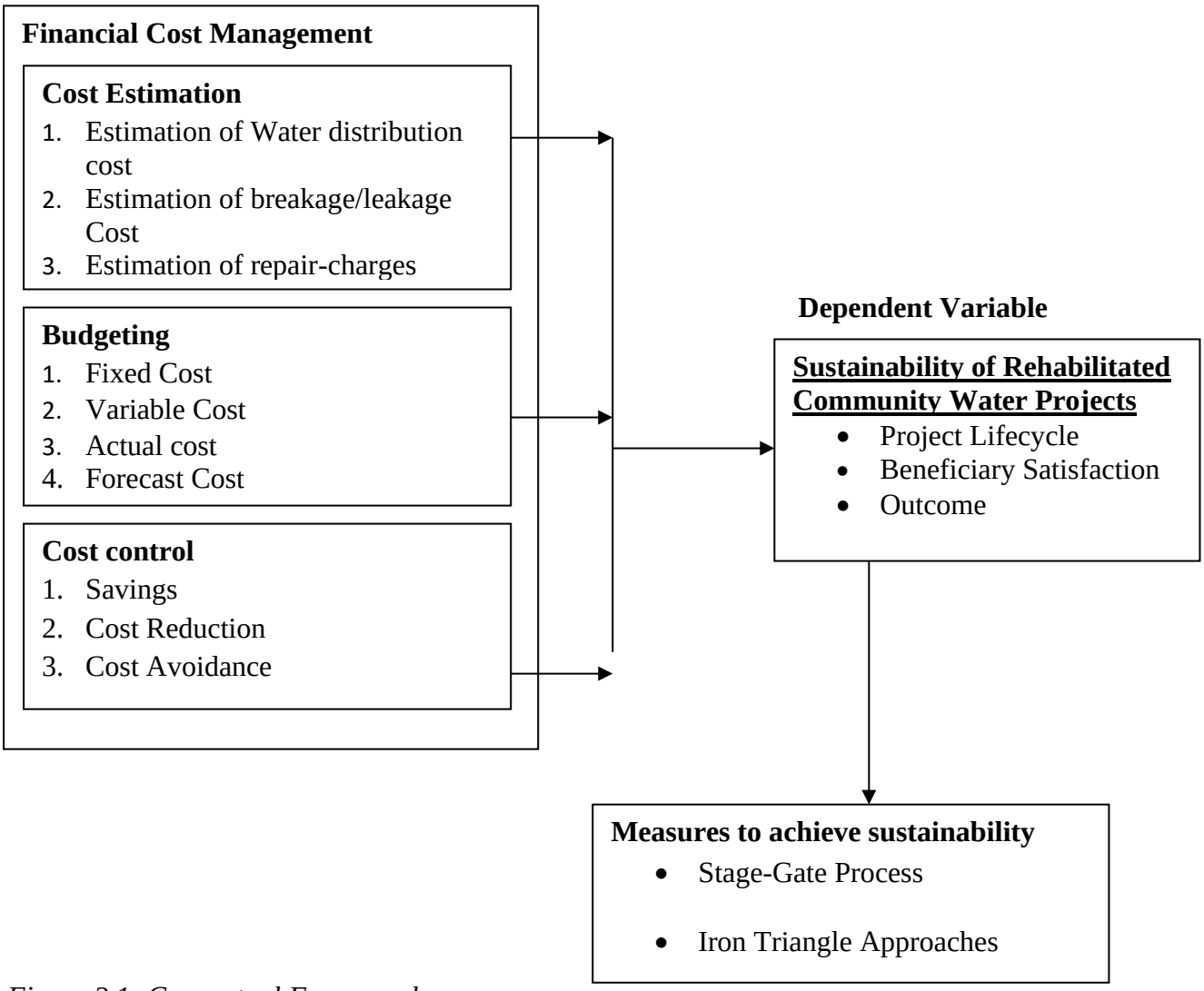

Figure 2.1: Conceptual Framework

RESEARCH METHODOLOGY

Introduction

This chapter highlights the methodological aspects of the study where details given regarding the procedures that are going to be used in conducting the study. These includes the research design, research philosophy, empirical model, Operationalization and measurement of Variables, target population, sampling design, data collection instrument, data collection procedures, data analysis and presentation.

Research Design

This study was both quantitative and qualitative in nature and therefore it applied both quantitative and qualitative data collection approaches. Quantitative data collection approach helped gather numerical data while the qualitative data collection approach helped in collecting respondents' suggestions and recommendations of the study.

The study employed both descriptive and correlational research designs. The descriptive research design described financial cost management and sustainability of rehabilitated community water distribution projects, as they were at the time of the study. Correlational research design determined the relationship between financial cost management and sustainability of rehabilitated community water distribution projects in Wau County.

Target Population

This study targeted rehabilitated community water distribution projects in Wau County as the units of analysis. The area had six rehabilitated water distribution projects with 42 committee members for the rehabilitated community water distribution projects committee. These were typically committees of 7 elected community members or otherwise delegated by their community to take responsibility for a rehabilitated community water distribution project. This is shown in Table 3.1.

Table 3.1: Target Population

Name of rehabilitated Community water Distribution Projects	**Target Population**
Hai Nasira water yards	7
Jebel Kire Water yard	7
Hai Lokoloko water yard	7
Hai Matamdia water yard	7
Hai Bilpam water yard	7
Hai Kosti water yard	7
Total	42

Sampling Design and Sample Size

The study used a purposive and census sampling techniques whereby the researcher targeted only the committee members of the rehabilitated community water distribution project in Wau County based on their knowledge and experience about financial cost management and sustainability of the rehabilitated community water distribution projects. Census sampling was applicable whereby the list of committee members managing the each of the rehabilitated community water distribution projects. The list contained the names, address and where possible the phone number of each committee member. Thus, the list guided the researcher in identifying the study respondents.

The following mathematical formula by Taro Yamane (1979) determined the sample size.

$$n = \frac{\mathrm{N}}{1 + \mathrm{N}[\mathrm{e}]^2}$$

Where;

- N = total population (42)
- n = total sample size
- E = desired margin error (0.05)

$$n = \frac{42}{1 + 42[0.05]2}$$

$$n = \frac{42}{1 + 42[0.0025]}$$

$$n = \frac{42}{1 + 0.105}$$

$$n = \frac{42}{1.105}$$

$$n = 38\ respondents$$

Table 3.2: Sample Size

Name of rehabilitated Community water Distribution Projects	**Target Population**	**Sample Size**
Hai Nasira water yards	7	6.3
Jebel Kire Water yard	7	6.3
Hai Lokoloko water yard	7	6.3
Hai Matamdia water yard	7	6.3
Hai Bilpam water yard	7	6.3
Hai Kosti water yard	7	6.3
Total	42	37.8

Since the sample size is less than 200, the researcher considered the entire target population of 42 committee members managing rehabilitated community water distribution project in Wau County.

Data Collection Instruments

This study used focus group questionnaire methods involving persons of rehabilitated Community Water distribution projects to provide quantitative data and key informant interview to gather qualitative data from the key informants involving 6 chairpersons of the 6 rehabilitated community water distribution project committees. Thus, the study involved 6 members in the focus group and in the interview.

Self-administered Questionnaires

The study used a self-administered questionnaire, which consisted of a set of well-formulated questions to probe and obtain responses from respondents confidentially. The self-administered questionnaire consisted of four sections. Section A questions was on demographic information of the respondents, Section B questions was on financial cost management, Section C questions was on sustainability of water distribution projects and Section D was on suggestions and recommendations of the respondents. The instrument had both closed and open-ended questions whereby the close-ended questions guided by a five point Likert scale of strongly agree, agree, not sure, disagree and strongly disagree. This gave the respondents an allowance in making their choice.

Table 3.3: Showing the Operationalized Likert Scale

Mean range	Interpretation		Value	Scale
1.00- 1.80	Very low		1	Strongly Disagree
1.81- 2.60	Low		2	Disagree
2.61-3.40	Moderate		3	Not Sure
3.41- 4.20	High		4	Agree
4.21 -5.00	Very High		5	Strongly Agree

Interview Guide for the Key Informants

An interview guide was used as the instrument to collect in-depth qualitative data in which the researcher set some questions the study used to interview community leaders. The researcher used probing questions that were able to extract very sensitive information from the key informants. There was a key informant interview to gather qualitative data from the key informants involving 6 chairpersons of the 6 rehabilitated community water distribution project committees.

Validity of the Instrument

Validity measures the extent to which the instrument achieves what it sets out to do (Smith, 2003). Measuring of the validity of the instrument is through calculation of Content Valid Index (CVI). That is the total number of valid items/ total number of items. If the index got is 0.7 and above then the instrument is valid for the study (Amin, 2005). Construct validity was checked by going through and reconstructing some of the items that was found not valid by the use of Content Valid Index. Consultation of research supervisors and other experts helped in the validation of the research instruments. The researcher calculated the Content Validity Index (CVI) using the formula.

$$\text{CVI} = \frac{\text{Relevant Items}}{\text{Total Number of Items}}$$

Reliability of the Instrument

In determining the reliability of the research instrument, a pre-test (Pilot Study) of 20 questionnaires to 20 community water-management persons from Ayein County was considered. Since the two share similar characteristics. Mugenda and Mugenda (2003) support this by who stating that 20-50 respondents can be used for testing reliability of the instrument. The 20 coded questionnaires in SPSS computer package tested for the reliability. Cronbach's alpha scale recommends a coefficient of 0.7 and above as an adequate measure of internal consistency (Mugenda & Mugenda, 2003). The results of the reliability test are presented in Table 3.4.

Table 3.4: Results of the Reliability Test

Research Variable	**Cronbach's Alpha Index (α)**	**Number of Questionnaire Item**	**Comment**
Cost estimation	0.802	4	Reliable
Budgeting	0.765	4	Reliable
Cost control	0.735	4	Reliable
Project sustainability	0.825	4	Reliable
Average Score	**0.781**	**16**	**Reliable**

Source: Pilot Study (2021)

The result from reliability was given as follows; cost estimation, budgeting, cost control and project sustainability with Cronbach alpha values as 0.802, 0.765, 0.735 and 0.825 respectively produced using SPSS 21.0. The average alpha coefficient for every individual variable was above 0.7 which satisfies the recommendation made by Mugenda and Mugenda (2003) that an alpha coefficient score of above 0.7 shows that the instruments are highly reliable. According to Punch (2015) who recommended that an alpha coefficient of between 0.75 and 1.0 is reliable for the findings to be done obtained. Therefore, the average score of Cronbach's Alpha Index (α) value of 0.781 obtained was thus acceptable as it is within the range.

Data Collection Procedure

The researcher got an introductory letter from the Dean School of Graduate Studies-Kenyatta University, introducing him as a student carrying out research on the topic under investigation. Prior to data collection, the researcher presented the letter to Wau County Water Board and well as the local government. Thus, the researcher visited village elders, introduce himself, and provide them with facemasks for protection in this period of COVID - 19. In addition, the researcher carried sanitizers for the use by the village elders, himself and those who were responding to the questionnaires. Thus, with the guidance of the village elders, the researcher was introduced to the community water distribution projects, provide them with face masks (in case they don't have), sanitized them and administered a

questionnaire to each of them at a time. After filling the questionnaire, the researcher picked the answered questionnaire, re-sanitized the respondent, and thank them before proceeding to another water point. To achieve the sample size, the procedure would go on. For the sake of the key informants, the researcher visited Wau County Local Government Offices; get the list of members of the County Water Board, which guided him in data collection. The list contained the phone numbers of each board member for the researcher to call them and inquired for an appointment with each of them. After getting the appointments, the researcher met the key informants, interview them and record the information. The researcher considered all measures given by the Ministry of Health in combating the spread of COVID-19 whereby the researcher wore a facemask, sanitized himself and the key informant before the interview schedule. The researcher treated information obtained with utmost confidentiality, as it would be for academic purposes only.

Ethical Consideration

For ethical consideration, the researcher got an introductory letter before administering the questionnaire. The data and the results were presented as they were without any manipulation of any kind. Respondents' privacy was observed at uttermost level of confidentiality. A letter of informed consent was presented and attached in the appendices. Afterwards the researcher visited the study area and self-administered to the questionnaires to the intended respondents, collect the tools after being filled.

Data Processing and Presentation

Data Processing

Data processing in this study refers to editing, coding, transcription, data entry and data cleaning tabulation and report formatting to ensure that the data collected is accurate and complete before data analysis. During and after fieldwork, the process of data processing took place.

Editing-This was a process of examining the collected raw data to detect errors and omission and to correct these where possible. Editing involves a careful scrutiny of the completed questionnaires. To ensure that the data is accurate, consistent, editing took place. Field editing was done while in the field and after fieldwork central editing took place in preparation for data analysis.

Coding-This was done after the researcher has classified the raw data into some purposeful and usable categories. It was a process of assigning numerals or other symbols to the responses. The structured questions went through pre-coded by assigning them numerical and alphabetical numbers before fieldwork. Post coding was carried out on responses from open-ended questions which involved assigning them numbers, and entering the response into the computer for analysis.

Data Entry: Statistical Package for Social Science (SPSS) helped in data entry. There was data cleaning involving detecting inaccurate entries from the computer. It involved identifying incomplete, incorrect, inaccurate, irrelevant entries among other parts of the data and then replacing, modifying or deleting the useless data.

Tabulation-This involved the process of summarizing raw data and displaying the same in compact form, for interpretation. That was in the form of tables for further analysis.

Data Analysis

Objectives 1, 2, 3 and 4 were analyzed using descriptive statistics (mean, and standard deviation). Through descriptive statistics of frequency and percentages, the researcher analyzed the demographic information of the respondents. The qualitative data from key informant was analyzed using thematic analysis or narration approach to describe recorded statements from respondents and then through quote and quote method or presentation to support the quantitative data. Quantitative data for the objectives was presented using mean and standard deviation whereby a mean of 1.00- 1.80 was interpreted as a very low mean, 1.81- 2.60 was regarded as a low mean, 2.61-3.40 is a moderate, 3.41- 4.20 a high, and 4.21 - 5.00 interpreted as very high mean. To determine the influence of the dependent variable indicators towards the dependent, the researcher plotted a linear regression table.

Diagnostic Tests

Normality Test: Normality test is used to test whether a variable is normal distribution or not. The main reason of conducting normality testing is that it is necessary for the researcher to know whether the population or data involved in the research is in normal distribution. In this study therefore, pie charts were plotted when testing for normality in the study.

Homoscedasticity Test: Homoscedasticity suggests equal levels of variability between quantitative dependent variables across a range of independent variables that are either continuous or categorical. This entry focuses on defining and evaluating homoscedasticity in both univariate and multivariate analyses. In this study, this was computed using the ANOVA procedure.

RESEARCH FINDINGS AND DISCUSSION

Introduction

This chapter presents the findings of data collected from the field. The response rate is given first followed by background information of the respondents, descriptive statistics and regression analysis.

Response Rate

A total of 38 questionnaires were administered to the respondents and the response rate is presented in Table 4.1.

Table 4.1: Response Rate

Category	Frequency	Percentage
Responded	36	94.7
Non-responded	2	5.3
Total	**38**	**100**

Source: Survey Data (2021)

Table 4.1 indicates that the study had a response rate of 94.7% and a non response rate of 5.3%. As per the recommendation by Baruch (2012) that a response rate of above 80% is sufficient for data analysis. Therefore, 94.7% study response rate was considered appropriate for data analysis. This meant that there was acceptance and credibility of the research findings of the study due to high response rate.

Background Information

On the background information of the respondents, the study sought information on the respondents' gender, age, level of education and operation experience in the committee.

Gender

Table 4.2: Respondents' Gender

Gender	Frequency	Percentage
Male	22	61.1
Female	14	38.9
Total	**36**	**100**

Source: Survey Data (2021)

The results in Table 4.1 show that male respondents accounted majority as indicated by 61.1% while female respondents accounted for 38.9%. Gender of the respondents was necessary to show a true representative of both men and women in the study which means giving equal importance to both men and women on project sustainability.

Age

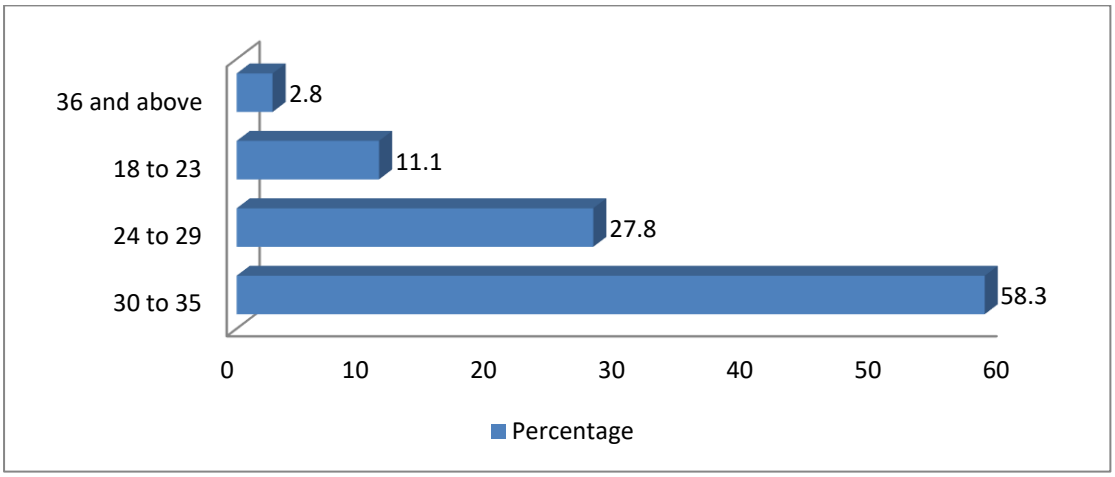

Figure 4.2: Respondents' Age

Source: Survey Data (2021)

The results in figure 4.2 indicate that 58.3% of the respondents were aged between 30 to 35 years followed by those who were aged between 24 to 29 years at 27.8%, 11.1% were aged between 18 to 23 years and 2.8% aged 36 years and above. Age diversity was important to the study as it brings about different experiences, expectations, styles and perspective on project sustainability.

Education Level

Table 4.3: Respondents' Education Level

Education level	Frequency	Percentage
Tertiary	17	44.7
Secondary	10	26.3
Primary	9	23.7
None	0	0.0
Total	**36**	**100**

Source: Survey Data (2021)

The results in Table 4.3 show that majority (44.7%) had a attained a tertiary level of education, 26.3% had a secondary certificate, 23.7% had a primary certificate. It can be concluded that the respondents involved in the study had a higher education level. Higher education level of an employee is important in making an organization a success because an individual has the knowledge and skills required for project sustainability.

Operational Experience in the Committee

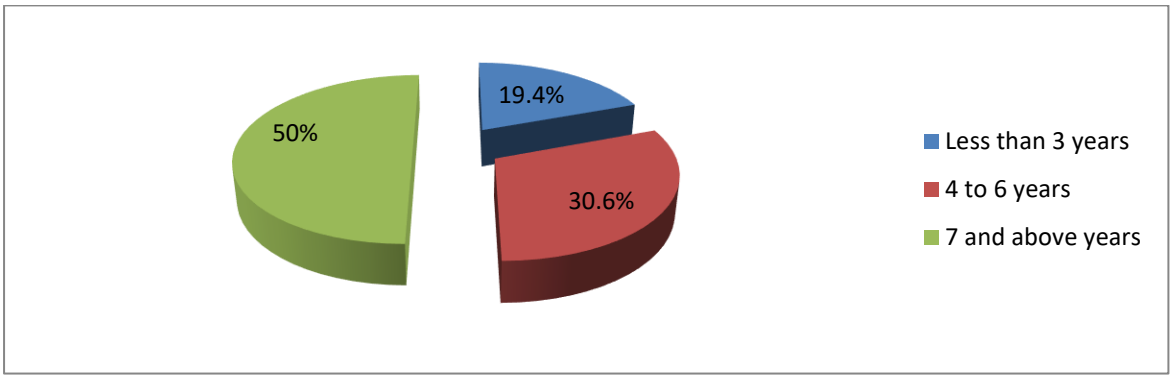

Figure 4.3: Operational Experience in the Committee

Source: Survey Data (2021)

The results in Figure 4.3 show that most of the respondents had an operational experience in the committee for 7 years and above, 30.6% between 4 to 6 years and 19.4% less than 3 years. These results confirm that the respondents involved in this study had necessary experience to provide the information that was of interest to the researcher.

Descriptive Statistics

Descriptive statistics such as Mean (M) and Standard Deviation (SD) were used to present quantitative data with the use of Statistical Package for Social Sciences (SPSS) version 17.0. The findings of the descriptive statistics were based on study specific variables and presented as follows.

Cost Estimation

The study sought to determine the influence of cost estimation on sustainability of rehabilitated community water distribution projects of Wau County, South Sudan. The findings are presented in Table 4.4.

Table 4.4: Cost Estimation

Statement	M	SD
Estimation of water distribution cost helps you to save adequate fund for future use	4.11	1.116
Keeping some money for future breakage/leakage of water pipes has helped your water distribution project efficient	4.03	0.845
Estimation of water project repair-charges leads to a continuous water service provision in your area	4.58	0.615
Cost estimation ensures that there are no cases of over payment	4.06	0.826

hence helping your project save for the future		
Aggregate Score	**4.12**	**0.851**

Source: Survey Data (2021)

The aggregate score of 4.12 shows that the respondents agreed that cost estimation influences sustainability of rehabilitated community water distribution projects of Wau County, South Sudan with a standard deviation of 0.851. These findings agree with the findings of Rodríguez-Miranda (2015) study which found out that estimation of water distribution cost is important in achieving the required level of community water-distribution project sustainability.

The respondents strongly agreed on the statement that estimation of water project repair-charges leads to a continuous water service provision in your area as shown by mean score of 4.58 and a standard deviation of 0.615. These findings are consistent with McGivney and Kawamura (2018) study that established that estimation of operation cost is of great help towards achieving the required project sustainability. In another study, Gratziou and Chrisochoidou (2016) estimated the costs of water treatment plants with the help of statistical methods and analyses whereby it was suggested that estimation of water treatment cost is vital towards community water project sustainability.

The respondents agreed on the statements that estimation of water distribution cost helps you to save adequate fund for future use, cost estimation ensures that there are no cases of over payment hence helping your project save for the future and that keeping some money for future breakage/leakage of water pipes has helped your water distribution project efficient as shown by mean score of 4.11, 4.06 and 4.03 respectively and a standard deviation of 1.116, 0.826 and 0.845. These findings are in line with Biniyam (2015) study that indicated most of the estimated cost of the projects is either under-utilized or over utilized which shows there is undeniable inaccuracies in the cost estimation.

Budgeting

The study sought to determine the influence of budgeting on sustainability of rehabilitated community water distribution projects of Wau County, South Sudan. The findings are presented in Table 4.5.

Table 4.5: Budgeting

Statement	M	SD
Operating your water project within the set budget helps reduce unwanted water supply cost	4.44	0.652
Monthly water distribution cost budget has helped your water supply project function more effective	4.66	0.654
Inclusion of money for repair of water pipes has contributed to	4.56	0.558

continuous distribution of water to the people		
Including miscellaneous expenses in the budget helps you during water supply emergencies	3.67	1.549
Aggregate Score	**4.28**	**0.853**

Source: Survey Data (2021)

The aggregate score of 4.28 shows that the respondents agreed that budgeting influence sustainability of rehabilitated community water distribution projects of Wau County, South Sudan with a standard deviation of 0.853. This finding concur with Ngacho and Das (2014) that found that cost budgeting affects sustainability of community projects but it is not indicated on how cost budgeting is carried out and how it influences sustainability rehabilitated community water distribution projects in Wau County.

The respondents strongly agreed on the statements that monthly water distribution cost budget has helped your water supply project function more effective and that inclusion of money for repair of water pipes has contributed to continuous distribution of water to the people as shown by mean score of 4.66 and 4.56 respectively and standard deviation of 0.654 and 0.558 respectively. This is consistent with Carvalho and Rabechini (2015) study that revealed that cost budgeting is an indicator of financial cost management and it influences sustainability of community projects.

The respondents agreed on the statements that operating your water project within the set budget helps reduce unwanted water supply cost and that including miscellaneous expenses in the budget helps you during water supply emergencies as shown by mean score of 4.44 and 3.67 respectively and standard deviation of 0.652 and 1.549 respectively. This agree with study findings of De Vita, Tekaya and Wang (2010) study that found that the total variable cost to a water project is a great determinate of the level of sustainability of any community water project.

Cost Control

The study sought to determine the influence of cost control on sustainability of rehabilitated community water distribution projects of Wau County, South Sudan. The findings are presented in Table 4.6.

Table 4.6: Cost Control

Statement	M	SD
Using quality water supply materials (such as pipes or tanks) has helped your project from incurring unnecessary repair charges	3.25	1.481
You have been evaluating different technicians to pick the most efficient and effective in their work. This has promoted the level and cost of sustaining your water project	4.56	0.773

You have been evaluating different technicians to pick the most affordable hence reducing the cost of supplying water	3.58	1.730
Careful use of water supply equipments/facilities (taps, tanks) has replacement cases in your area	3.97	1.082
Aggregate Score	**3.84**	**1.267**

Source: Survey Data (2021)

The aggregate score of 3.84 shows that the respondents agreed that cost control influence sustainability of rehabilitated community water distribution projects of Wau County, South Sudan with a standard deviation of 1.267. This concur with Young Hoonk Wak and Williams Ibbs (2002) study that established that cost control is crucial because cost overruns are common resulting in serious cost problems during project execution leading to project failure and inability to be sustainable.

The respondents strongly agreed on the statements that the organization have been evaluating different technicians to pick the most efficient and effective in their work. This has promoted the level and cost of sustaining your water project as shown by mean score of 4.56 and standard deviation of 0.773. This is in line with Abdelsalam and Gad (2009) study that indicate that COC activities are positively associated with sustainability rehabilitated community water distribution projects.

The respondents agreed on the statements that careful use of water supply equipments/facilities (taps, tanks) has replacement cases in your area and that the organization has been evaluating different technicians to pick the most affordable hence reducing the cost of supplying water as shown by mean score of 3.97 and 3.58 respectively and a standard deviation of 1.082 and 1.730 respectively. This agrees with Brown (2002) study that established that economic security is increased and financial services are brought closer to community water management committees hence making it easy for them to provide continuous water supply services to the community members.

The respondents indicated to a moderate extent that using quality water supply materials (such as pipes or tanks) has helped your project from incurring unnecessary repair charges as shown by mean score of 3.25 and standard deviation of 1.481. This in contrary to the findings of Young Hoonk Wak and Williams Ibbs (2002) study that established that cost control is crucial because cost overruns are common resulting in serious cost problems during project execution leading to project failure and inability to be sustainable.

Measures to Promote Project Sustainability

The study sought to find out measures to promote sustainability of rehabilitated community water distribution projects of Wau County, South Sudan. The findings are presented as follows.

The respondents indicated that the community should assist in discouraging children playing with water taps, the organization should sensitize the community to safeguard the existing water facilities, promote hygiene, hold frequent meetings to make the community aware of increasing tariff charges, the committee to embrace water saving culture for future expansion of water kiosks, the community to be educated on maintenance of water kiosks, discourage children from going to the water kiosks, save money so that incase of breakage they are able to buy the spare parts required.

Sustainability of Rehabilitated Community Water Project

The study sought to find out the extent sustainability of rehabilitated community water distribution projects of Wau County, South Sudan. The findings are presented in Table 4.7.

Table 4.7: Sustainability of Rehabilitated Community Water Project

Statement	M	SD
It takes a longer time before experiencing water breakage hence making it easy for the sustainability of the water project	4.58	1.204
You are able to spend less than the set budget in the last three years	4.75	0.604
You have been able to save adequate funds through community contributions for future use	4.81	0.401
There are no abandoned or none functional water supply channels in the area	3.94	0.532
Aggregate Score	**4.52**	**0.685**

Source: Survey Data (2021)

The aggregate score of 4.52 shows that the respondents strongly agreed that financial cost management influence sustainability of rehabilitated community water distribution projects of Wau County, South Sudan with a standard deviation of 0.685. This concurs with Silvius and Schipper (2014) study that found that the management should strive to involve, motivate and promote the stakeholder's participation in their projects. The stakeholder's participation must reflect the all project management procedures being performed.

The respondents strongly agreed on the statements that they have been able to save adequate funds through community contributions for future use, they are able to spend less than the set budget in the last three years and that it takes a longer time before experiencing water breakage hence making it easy for the sustainability of the water project as shown by mean score of 4.81, 4.58 and 4.75 respectively and standard deviation of 0.401 and 0.604 respectively. This agrees with the Cranfield University (2014) study on numerous community management of water in India that showed that for community management to be successful, a certain level of socioeconomic wealth is necessary, but not sufficient.

The respondents agreed on the statements that there are no abandoned or none functional water supply channels in the area as shown by mean score of 3.94 and standard deviation of 0.532. This is in consistent with Rose (2015) observation that sustainability is therefore the ability of a project to continue serving its own intended purpose beyond its set budget by the funder. However, in spite of good intentions, water aid has not consistently provided the developing world with lasting and sustainable solutions to their water needs.

Diagnostic Test Results

Normality Test

Table 4.8: Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Cost estimation	.313	36	.000	.762	36	.000
Budgeting	.235	36	.000	.794	36	.000
Cost control	.303	36	.000	.679	36	.000

a. Lilliefors Significance Correction

Source: Survey Data (2021)

Table 4.8 shows that the p-value for both tests is less than 0.05 using both normality tests, the Kolmogorov Smirnov test and the Shapiro-Wilk tests, so the null hypotheses were rejected since the p-values were small enough and it was concluded that data on both dependent and independent factors were not normally distributed and thus helped to predict dependent variables.

Homoscedasticity Test

Table 4.9: Homoscedasticity Test

Levene's Test of Equality of Error Variances[a]

F	df1	df2	Sig.
0.687	3	36	0.802

Checking the null hypothesis that the dependent variable's error variance is equal across classes.

Source: Survey Data (2021)

The results in Table 4.9 shows that the significance value is ate 0.802 which means that there is no significance difference from variance of the dependent variable is equal across groups. Therefore, this condition is satisfied.

Inferential Statistics

Inferential statistics including correlation analysis and regression analysis was done to reach conclusions about associations between variables. They results are presented as follows;

Correlation Analysis

Table 4.9: Correlation Analysis

		Cost estimation	Budgeting	Cost control	Project sustainability
Cost estimation	Pearson Correlation	1	.363*	.396*	.182
	Sig. (2-tailed)		.030	.017	.288
	N	36	36	36	36
Budgeting	Pearson Correlation	.363*	1	.377*	.430**
	Sig. (2-tailed)	.030		.023	.000
	N	36	36	36	36
Cost control	Pearson Correlation	.396*	.377*	1	.597**
	Sig. (2-tailed)	.017	.023		.000
	N	36	36	36	36
Project sustainability	Pearson Correlation	.182	.430**	.597**	1
	Sig. (2-tailed)	.288	.009	.000	
	N	36	36	36	36

*. Correlation is significant at the 0.05 level (2-tailed).

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

Source: Survey Data (2021)

A Pearson product-moment correlation was conducted to examine the relationship between Cost estimation, budgeting and cost control and project of rehabilitated community water distribution projects of Wau County, South Sudan. The findings in Table 4.8 explains that cost control explains much more of variability in project sustainability than does budgeting and cost estimation at 5% (0.05) significance level.

Regression Analysis

Regression analysis was carried out to show how independent variables were related to dependent variable. The findings are presented in Table 4.10.

Table 4.10: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.648[a]	.719	.709	.520	.419	7.706	3	32	.001

a. Predictors: (Constant), Cost control, Budgeting, Cost estimation

Source: Survey Data (2021)

Table 4.10 shows a model summary that provides information about the regression line's ability to account for the total variation in the dependent variable. The result on adjusted R^2 indicates that cost control, budgeting and cost estimation explain 0.709(70.9%) of the changes in the project sustainability of rehabilitated community water distribution projects of Wau County, South Sudan. This means that other variables not studied contribute 0.291(29.1%) of the project sustainability.

Table 4.11: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.245	3	2.082	7.706	.001[a]
	Residual	8.644	32	.270		
	Total	14.889	35			

a. Predictors: (Constant), Cost control, Budgeting, Cost estimation

b. Dependent Variable: Project sustainability

Source: Survey Data (2021)

The significance value is 0.000[a] which is less that 0.05 thus the model is statistically significance in predicting how cost control, budgeting and cost estimation variables influenced the project sustainability of rehabilitated community water distribution projects of Wau County, South Sudan. The F calculated at 5% level of significance was 7.706. Since F calculated is greater than the F critical (p value = 2.082), this shows that the overall model was significant.

Table 4.12: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.746	.740		2.360	.001
	Cost estimation	0.641	.161	1.133	2.879	.002

Budgeting	0.515	.119	3.272	1.811	.001
Cost control	0.847	.152	1.547	3.589	.000

a. Dependent Variable: Project sustainability

Source: Survey Data (2021)

Table 4.12 shows that holding cost control, budgeting and cost estimation variables to a constant, project sustainability of rehabilitated community water distribution projects of Wau County, South Sudan would be 0.746(74.6%). It was established that a unit increase in cost estimation would lead to increase in project sustainability of rehabilitated community water distribution projects of Wau County, South Sudan by a factor of 0.641, a unit increase in budgeting would lead to increase in project sustainability of rehabilitated community water distribution projects of Wau County, South Sudan by a factor of 0.515 and a unit increase in cost control would lead to increase in project sustainability of rehabilitated community water distribution projects of Wau County, South Sudan by a factor of 0.847.

The established regression equation by the study resulted to:

$Y = 0.746 + 0.641X_1 + 0.515X_2 + 0.847X_3$

Where Y = Project sustainability

X_1= Cost estimation

X_2= Budgeting

X_3= Cost control

SUMMARY, RECOMMENDATION AND CONCLUCSIONS

Introduction

This section includes a summary of results, policy and practice suggestions, conclusions and suggestions for further research.

Summary

The overall objective of the study is to investigate the influence of financial cost management on sustainability of rehabilitated community water distribution projects in Wau County, South Sudan. The study specific objectives were to determine the influence of cost estimation, budgeting and cost control on sustainability of rehabilitated community water distribution projects. The study employed both descriptive and correlation research designs. This study targeted rehabilitated community water distribution projects in Wau County as the units of analysis. The study used a purposive and census sampling techniques. This study used focus group questionnaire methods. Analysis of data involved both descriptive statistics and inferential statistics. The results are presented as follows;

The study sought to determine the influence of cost estimation on sustainability of rehabilitated community water distribution projects of Wau County, South Sudan and

established that cost estimation had a positive and significant influence on sustainability of rehabilitated community water distribution projects of Wau County, South Sudan. Estimation of water project repair-charges leads to a continuous water service provision in your area and that estimation of water distribution cost helps you to save adequate fund for future use.

The study sought to determine the influence of budgeting on sustainability of rehabilitated community water distribution projects of Wau County, South Sudan and revealed that budgeting had a positive and significant influence on sustainability of rehabilitated community water distribution projects of Wau County, South Sudan. Monthly water distribution cost budget has helped your water supply project function more effective and that inclusion of money for repair of water pipes has contributed to continuous distribution of water to the people.

The study sought to determine the influence of cost control on sustainability of rehabilitated community water distribution projects of Wau County, South Sudan and found that cost control had a positive and significant influence on sustainability of rehabilitated community water distribution projects of Wau County, South Sudan. The organization has been evaluating different technicians to pick the most efficient and effective in their work. This has promoted the level and cost of sustaining your water project.

The study sought to find out measures to promote sustainability of rehabilitated community water distribution projects of Wau County, South Sudan and the respondents indicated that the community should assist in discouraging children playing with water taps, the organization should sensitize the community to safeguard the existing water facilities, promote hygiene, hold frequent meetings to make the community aware of increasing tariff charges, the committee to embrace water saving culture for future expansion of water kiosks, the community to be educated on maintenance of water kiosks, discourage children from going to the water kiosks, save money so that incase of breakage they are able to buy the spare parts required.

Conclusion

On cost estimation, the study concluded that cost estimation enables project managers to set clear expectations with stakeholders, control scope creep due to transparencies established with the customer, track progress and respond with corrective action at a quick pace, maintain expected margin, increase return on investment, avoid losing money on the project and generate data to benchmark for future projects and track long-term cost trends.

On budgeting, the study concluded that budgeting outlines the financial resources available, which further determines the human resources that are required. Budgeting acts as a management tool to determine if they are on track to meet their goals. Budgeting support the organization or project team in prioritizing which parts of the project can be completed based on the remaining budget, while simultaneously determining which pieces will be put on hold.

On cost control, the study concluded that controlling costs lowers the overall expenses in an organization. Helps the project managers to clearly identify activities running smoothly and staying within budget from the ones constantly breaking down and consuming extra money. Allows allow the project managers to look for better bargains on the goods and services that required for the project. With the help of cost management, project managers can easily determine the necessity of technology and accordingly implement it for project completion. This helps the project manager to utilize the saved cost for other beneficial tasks.

Recommendations

On cost estimation, the study recommended that project managers should identify resources that are required, the price of each resource, duration that each resource is required, list of assumptions, potential risks, past project costs and industry benchmarks, if any and insight into the organization's financial health and reporting structures. Also, project managers have to consider factors such as fixed and variable costs, overheads, inflation and the time value of money.

On budgeting, the study recommended that the project budget should consider cost planning in terms of labour costs, material costs and operating costs. The budget should be used to effect estimated changes in the scope of the project, better and more realistic forecasted cost budget and insufficient funds for an ongoing project.

On cost control, the study recommended that the project manager should plan for the project budget to help for all payments that need to be made and costs that will incur during the project life cycle. Keep track of costs to help in keeping track of the budget of a project in each of its phases. The project manager would need to constantly remind his/her team of the important deadlines of the project in order to ensure that work is completed on time. Change control systems are essential to take into account any potential changes that could occur during the course of the project as it may increase project cost by increasing the effort needed for the project.

Suggestions for Further Studies

The current study investigates the influence of financial cost management on sustainability of rehabilitated community water distribution projects in Wau County, South Sudan. Financial cost management was measured in terms of cost estimation, budgeting and cost control. Therefore, the study suggests that further studies should be carried out that focus on different measures of financial cost management on project sustainability.

REFERENCES

Abdal-Hadi, M. A. (2010), Factors affecting accuracy of pre-tender cost estimate in Gaza Strip. Unpublished master thesis in construction management, The Islamic University of Gaza-Palestine.

Abdelsalam, H.M.E.and Gad, M.M (2009). International Journal of Project Management 27, 501-511 (2009).

ADI (2004). African Development Indicators, World Bank Database. The International Reconstruction and Development/World Bank. Pp. 319.

African Development Bank (AfDB) Group, (2013). *South Sudan: An Infrastructure Action Plan* Retrieved from: https://www.afdb.org/en/countries/east-africa/south-sudan/infrastructure-action-plan-in-south-sudan-a-program-for-sustained-strong-economic-growth

Agndal, H. & Nilsson, U. (2009). Interorganizational financial cost management in the exchange process. Management Accounting Research,20,85-101.

Al-Tmeemy, S.M.H.M., Abdul-Rahman, H.andHarun, Z. (2011). International Journal of Project Management 29, 337-348 (2011).

Angmor, Emmanuel & Caroline, Tettey & Twumasi, Amoah. (Eds).(2016). *Management rehabilitated community water distribution projectss: Assessing the challenges of indigenous arrangements.* Journal of Geography and Regional Planning. 9. 122-127. 10.5897/JGRP2015.0540.

Asano, T., Burton, F., et al (2007). Water Reuse. Metcalf & Eddy. New York: McGrawHill, 2007.

Barzandeh B (2011), Accuracy of estimating techniques for predicting residential construction costs – a case study of an Auckland residential construction company.

Brazeal, D.C (2010). Applying the theories of sustainable water aid. Theses and Dissertations - Department of Civil and Environmental Engineering. Accessed on 30th 2020 on http://hdl.handle.net/10217/44842

Biniyam T (2015). Assessment of factors affecting the accuracy of cost estimation in project management: The case of water works design & supervision enterprise. Masters Thesis in Business Administration. Addis Ababa, Ethiopia

Caglio, A. & Ditillo, A. (2008). A review and discussion of management control in inter-firm relationships: Achievements and future directions. Accounting, Organizations and Society,33,865-898.

Carvalho, M. M., & Rabechini, J. R. (2015). Impact of risk management on project performance: the importance of soft skills. International Journal of Production Research, 53, 321-340. doi:10.1080/00207543.2014.919423

Center for Promoting Development for Women and Children (DWC) - Swiss Agency for Development and Cooperation (SDC) (2013) ; *Community Management Project (CMP)*. Retrieved from http://doc.rero.ch/record/255564

Civil Society Budget Advocacy Group (CSBAG) (2017): *Alternative Water, Sanitation and Hygiene (WASH) Financing Mechanisms in Uganda*

Cordaid; (2015): *Our Peace, Our future Experiences from community managed disaster risk reduction approaches in South Sudan*

Cranfield University, (2014); *searching for success in Community management for rural water supplies over 30 years*

Cusworth, J.W. and Franks, T.R. (2013). Managing Projects in Developing Countries. Pearson Education Limited, Edinburgh Gate, England. Chapter11, pp.201-216 and Chapter 12, pp.217-228.

Davis, K. (2014). Different stakeholder groups and their perceptions of project success. International Journal of Project Management, 32, 189-201. doi:10.1016/j.ijproman.2013.02.006

De Vita, G., Tekaya, A. & Wang, C. L. (2010). Asset specificity's impact on outsourcing relationship performance: A disaggregated analysis by buyer-supplier asset specificity dimensions. Journal of Business Research,63,657-666.

Doulton USA (2006). Ceramic Candle & Cartridge Technologies. 2006. Accessed in November 2020 fromhttp://doultonusa.com/HTML%20pages/technology.htm

Drury-Grogan, L. M. (2014). Performance on agile teams: Relating iteration objectives and critical decisions to project management success factors. Information and Software Technology,56, 506-515. doi:10.1016/j.infsof.2013.11.003

Durga P. D. and Khet R. D. (2015). Mukunda Neupane Sustainable Community Water Supply System with Special Reference to Nepal

Eskerod, P., & Huemann, M. (2013). Sustainable development and project stakeholder management: What standards say. International Journal of Managing Projects in Business, 6(1), 36-50.

Field, M. and Keller, L. (2008). Project Management: The Open University, UK,

Franks, T.R. (2006). Sustaining Project Benefits, from MSC4 Course Manual 2006/07, pp.1- 16, University of Bradford, BCID.

Fuller, S. (2008). Life-cycle cost analysis. National Institute of Building Sciences, An Authoritative Source of Innovative Solutions for the Built Environment,1090.

Gang C, (2013). Financial cost management in Project Alliances: A Framework Based on Interorganizational Settings

Gareis, R., Huemann, M., Martinuzzi, A., Weninger, C., & Sedlacko, M. (2013, April). Project management and sustainable development principles. Project Management Institute.

Global water, (2019); *Overview on South Sudan water sanitation & USAID Global water and Development report for the year 201*. Retrieved from

Goedknegt, D., & Silvius, A. J. G. (2012). The implementation of sustainability principles in project management. In Proceedings of the 26th IPMA World Congress (pp. 875- 882).

International Committee of Red Cross South Sudan (2020). *Community water yards distribution projects*. Retrieved: https://www.facebook.com/ICRCinSSudan/videos/312116263497359/

Hair, J.F., Black, W.C., Babin, B.J.and Anderson, R.E. (2010). Multivariate Data Analysis (Pearson Prentice Hall, New Jersey, 2010).

Harvey, P. A. and Reed, B. (2004). Rural Water Supply in Africa: Building Blocks for Hand pump Sustainability. WEDC, Loughborough University, UK. Available at http://www.lboro.ac.uk/wedc/projects/shp

Honduras. Retrieved on March 5, 2010 fromwww.nationsencyclopedia.com

International Organization for Standardization (2010). ISO 26000. Guidance on Social Responsibility, Geneva.

Kerzner, H. (2009). Project management best practices: achieving global excellence (Vol. 14). John Wiley & Sons.

Labuschagne, C., Brent, A. C., & Van Erck, R. P. (2006). Assessing the sustainability performances of industries. Journal of cleaner production, 13(4), 373-385.

Laura A. Carlson and Vera Bitsch (2019). *Applicability of Transaction Cost Economics to Understanding Organizational Structures in Solidarity-Based Food Systems in Germany*: Retrieved from: https://res.mdpi.com/d_attachment/sustainability/sustainability-11 01095/article_deploy/sustainability-11-01095-v4.pdf

Lockwood, (2004). Scaling up community management of rural water supply. Thematic overview paper, IRC: Delft, the Netherlands. Available at http://www.irc.nl/content/view/full/8857

Management Study Guide (MSG), (2020); *Learn Management Concepts & Skills Rapidly*. Retrieved from: https://www.managementstudyguide.com/financial-management.htm

Mburung'a,S.M (2016). *Capital structure, management and sustainability of community water projects in Kieni constituency*, Nyeri County, Kenya. Retrieved from http://erepository.uonbi.ac.ke/bitstream/handle/11295/101310/PhD%20Thesis%2_0Solomon%20

Ministry of Water Resource and IrrigationSouth Sudan. ;(2011): *An Infrastructure Action Plan: Chapter 9 Water and Sanitation.* Retrieved from https://www.globalwaters.org/WhereWeWork/africa/south-sudan

M. Laurenceau, F. Destandau & A. Rozan (2009). *A transaction cost approach to assess the Water Framework Directive implementation.* Retrived from https://www.witpress.com/Secure/elibrary/papers/WRM09/WRM09050FU1.pdf

Mousa, A. (2015). A Business approach for transformation to sustainable construction: an implementation on a developing country. Resources, Conservation and Recycling,101, 9-19. doi: 10.1016/j.resconrec.2015.05.007

Munoz, D.R. et al (2008). In Search of Sustainable Community Development through Practice. Colorado School of Mines. 2008

Ngacho, C., & Das, D. (2014). A performance evaluation framework of development projects: An empirical study of Constituency Development Fund (CDF) construction projects in Kenya. International Journal of Project Management, 32, 492-507. doi:10.1016/j.jproman.2013.07.005

Novotny, V. (2003). Water Quality. Second Edition. Hoboken, NJ: John Wiley & Sons, 2003

Oliver E. W. (1993). Transaction Cost Economics and Organization Theory. Industrial and Corporate Change, Volume 2, Issue 2, 1993, Pages 107–156, https://doi.org/10.1093/icc/2.2.107

Olukanni D.O (2013). Assessment of wash program in public secondary schools in South-Western Nigeria. ARPN J. Eng. Appl. Sci. 2013;8:222

Papke-Shields, K. E., Beise, C., & Quan, J. (2010). Do project managers practice what they preach, and does it matter to project success?. International journal of project management, 28(7), 650-662.

Parry-Jones, S. Reed, R. and Skinner, B.H. (2001). Sustainable Hand Pump Projects in Africa. A Literature Review; WEDC, Loughborough University, UK.. Available at http://www.lboro.ac.uk/departments/cv/wedc/projects/shp/index.htm

Paulinus W. I. and Iyenemi I. K. (2014). Rural Water Supply Projects and Sustainable Development. Article (PDF Available) · April 2014 *with* 3,381 Reads

Ramaswami, Anu et al (2013). Integrating Developed and Developing World Knowledge into Global Discussions and Strategies for Sustainability. Environmental Science & Technology.

Rehema K. & Victor G. (2017); *Sustainability of Community Based Water Projects: Dynamics of Actors' Power Relations. Journal of Sustainable Development. 10. 79.10.5539/jsd.v10n6p79.* Retrieved from https://www.researchgate.net/publication/321392042_Sustainability_of_Commun ity_Based_Water_Projects_Dynamics_of_Actors'_Power_Relations

Sachs, Wolfgang et al (1993). The Development Dictionary. Zed Books Ltd, London, UK. 1993

Samiaah A. and Bassam A. (2018). An empirical analysis of the relationship between cost of control activities and project management success. DOI: 10.1051/matecconf/201816202036

Silvius, A. J., & Schipper, R. P. (2014). Sustainability in project management: A literature review and impact analysis. Social Business, 4(1), 63-96.

Silvius, A.J.G., Schipper, R., Planko, J., van den Brink, J., & Köhler, A. (2012). Sustainability in Project Management. Gower Publishing, Farnham.

The Nordic Africa Institute (2018); *Innovative Water Finance in Africa A Guide For Water Managers Volume 1 Water Finance Innovations in Context*

The World Bank Document; *Post Construction Support and Sustainability in Community Managed Rural water Supply Rural Water*. Retrieved from https://pdfs.semanticscholar.org/c1c1/a8920005d9776dc537a76cd857fac299bafb. pdf

The World Bank; (2019). *Multi –Donor Trust Fund for South Sudan: Improving Life for South Sudan's 8.3 Million People*. Retrieved from https://www.worldbank.org/en/news/feature/2013/05/28/multi-donor-trust-fund- for-south-sudan-improving-life-for-south-sudan-s-8-3-million-people

Turner, J. R. (2009). *The handbook of project-based management: Leading strategic change in organization (3rd Edition)*, The McGraw-Hill Companies.

United Nations Development Program (2006). *Beyond Scarcity: Power, Poverty and the Global Water Crisis, Human Development Report.*

UNDP – World Bank (1997); *Making Rural Water Supply Sustainable: Report on the Impact of Project Rules*

UNDP & Rose J.B., (2015); wikipedia; 2020 *Water, sanitation and the millennium development goals: a report card on global progress* Retrieved from https://pdfs.semanticscholar.org/c1c1/a8920005d9776dc537a76cd857fac299bafb. pdf

Wairimu, M. J., (2013). *Influence of Financial cost management on Performance of Community water supply projects in Kieni East District*, Nyeri County, Kenya Retrieved from: https://core.ac.uk/download/pdf/18520031.pdf

Water is Basic, (2015) Retrieved from https://www.waterisbasic.org

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

WHO Regional Office for Europe ;(2011). *Small-scale water supplies in the pan-European region*, Scherfigsvej DK-2100 Copenhagen Ø, Denmark. Retrieved from http://www.euro.who.int/pubrequest

World Health Organization (2014). *Investing in Water and Sanitation: Increasing Access, Reducing Inequalities.*World Health Organization; Geneva, Switzerland: 2014.