

**THE CONTRIBUTION OF COMMUNITY BASED WATER AND
SANITATION ORGANIZATIONS TOWARDS ACHIEVING
SUSTAINABILITY OF WATER PROJECTS IN TANZANIA: A CASE OF
PANGANI DISTRICT**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE
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CERTIFICATION

The undersigned certifies that he has read and here by recommends for acceptance by The Open University of Tanzania a dissertation entitled; **“The Contribution of Community Based Water and Sanitation Organizations Towards Achieving Sustainability of Water Projects in Tanzania: A Case of Pangani District”** in partial fulfillment of the requirements for the award of degree of Masters in Business Administration (MBA)

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DECLARATION

I, **Judith Nkya**, do hereby declare that, the work presented in this dissertation is original. It has never been presented to any other university or institution. Where other people's works have been used, references have been provided. It is in this regard that I declare this work as originally mine. It is hereby presented in partial fulfillment of the requirement for the Degree of Masters of Project Management (MPM).

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Signature

24/07/2023

.....
Date

DEDICATION

I dedicated this work to my beloved family for their outpouring of support especially for their prayers and encouraging words for all the time I was studying till now when am approaching the end of this entire course. May God bless them abundantly.

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Firstly, I would like to give thanks ALMIGHTY GOD for his grace and mercy which gave me strength, good health and ability to accomplish this research. Words cannot express my gratitude to my course coordinator who is also my research supervisor Dr lilian Macha together with Dr Dioniz Ndolage for their invaluable patience and feedback. Thanks, should also go to Doctors of Open university of Tanzania especially who lectured us during the whole time of study.

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ABSTRACT

This study aimed to examine the contribution of community-based water and sanitation organizations (CBWSOs) towards achieving sustainability of water projects in Tanzania. In order to achieve this objective, the study considered three independent variables including management skills of CBWSOs, water tariffs collected by CBWSOs and technical assistance of CBWSOs and one dependent variable which is sustainability of water projects. Data was collected from 100 respondents in Pangani district who were selected using stratified sampling. In this descriptive design study, data was collected using questionnaire, and analysed using descriptive statistics and inferential analysis including correlation analysis, ANOVA and multiple regression analysis with the aid of Statistical Package for Social Science. The findings of this study through multiple regression analysis indicated that management skills and water tariffs have positive and significant influence sustainability of water projects, yet, technical assistance have positive but not significant influence on sustainability of water projects. In respect to Beta coefficients, management skills influence sustainability of water projects by 55.5%, water tariffs influence sustainability of water projects by 43.0%, while technical assistance influence sustainability of water project by 1.7%. This study concludes that management skills, water tariffs and technical assistance are the critical factors which have enormous contribution to sustainability of water projects. This study recommends that CBWSOs' leaders and operators should be provided with training in order to uplift their skills useful for project management. In addition, the CBWSOs should ensure transparency on water tariffs collected from citizens including announcement of the income and expenditure to the community.

Keywords: *Water Tariffs, Management Skills, Technical Assistance, Water Project.*

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LIST OF ABBREVIATIONS

CBWSOs	Community Based Water and Sanitation Organizations
RUWASA	Rural Water Supply and Sanitation Agency
SPSS	Statistical Package for Social Science
UNICEF	United Nations International Children's Emergency Fund
URT	United Republic of Tanzania
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter covers the background of the problem, statement of the problem, research objectives and research questions. This chapter also covers the scope of the study and significance of the study.

1.2 Background to the Study

Globally, water is considered to be conserved by the hydrological cycle (Spellman, 2018) and covers 75% of the planet earth, in which only 2.5% is freshwater (Vorosmarty et al., 2005). The freshwater portion under the conservation concept is rather diminishing, for instance 80% of wastewater is globally not treated, and only 10% is treated efficiently (United Nations, 2010), due to increased demand through global population growth over time (Dilling et al., 2019). According to the United Nations International Children's Emergency Fund (UNICEF) and the World Health Organization (WHO) Report of 2019, billions of people around the globe have poor access to water, sanitation, and hygiene. About 2 billion people around the world have limited access to safely-managed drinking water services, while 3.6 billion people do not have safely-managed sanitation services (United Nations World Water Development Report, 2023).

Lack of sustainability of water projects is profound in developing countries compared to developed nations in America and Europe. This problem leads to poor access of water to the citizens as it is estimated that more than 1 billion people in the developing world unable to access reliable source of water on a daily basis (Tafara,

2013). The need to expand sustainable water source in Africa especially in rural settings is vital in order to save poor people living in those areas.

As a result of widen gap of access to water between developed and developing countries, the African countries depended on foreign assistance in terms of technical support, financial support, material support as well as institutional support (Lupasa, 2020). The increased desire among western countries to support rural development processes in developing countries led to emergence of the international development agencies (IDAs), non-governmental organizations (NGOs) as well as a number of donor-funded interventions (Muluh, et al., 2019).

Several studies have been conducted in African countries concerning the factors affecting sustainability of water projects. For instance, Cronk & Bartram, (2017) carried a study in Nigeria and found that Fee collection from people in the community who fetch water has enhanced higher water system functionality in Nigeria as the money collected from community has been useful for maintenance of water infrastructures and continuous improvement of the project (Cronk & Bartram, 2017). Cronk & Bartram, (2017) added that there is strong correlation between system security and administration units in charge of project management such as local authorities like districts, water administration authorities, private operators and so on.

This shows a potential for positive results that could be brought by community-based water and sanitation organizations (CBWSOs) that have been granted authority by the government of Tanzania to manage water supply in rural settings and continuous

maintenance and improvement of project infrastructures. In East Africa, Olela, (2018) carried out a study in Garbatula Sub County in Isiolo County, Kenya and indicate that choice of technology, socio-cultural factors, socio-economic factors, and specialized training and water tariffs have positive associations with sustainability of water projects.

In Tanzania, Lofingo (2019) observed that water supplied in rural-based authorities was quite different from that supplied in an urban setting as far as quality and quantity are concerned; urban-based supplies are more affordable to users than rural ones. System type matters as Nira hand pumps were found to be more functional in Tanzania than Afridey and India Mark II hand pumps (Cronk & Bartram, 2017). Chumbula and Massawe, (2018) strongly insisted that coordination of various institutions is an important aspect for the sustainability of water projects. Hence, local governments, donors and communities should make sure that technical aspects and regular follow-ups, as well as capacity building among members of the community and water user associations become an integral part of any water project for the realization of sustainability.

The contribution of Community Based Water and Sanitation Organizations (CBWSOs) sustainability of water projects have not been properly documented in Tanzania (Chumbula & Massawe, 2018), as result the role played by CBWSOs in the management of water projects is currently unknown. Therefore, this study addressed this problem by examining the contribution of CBWSOs towards achieving sustainability of water projects in rural settings, a case of selected

Tanzania.

This study focused on three independent variables including management skills, water tariffs and technical assistance which have been adopted from contingency theory that guide the current study (Armstrong & Taylor, 2014). According to contingency theory which was developed by Fred Edward Fieldler, the contingency factors including management skills, funds obtained through water tariffs and technical skills affect attainment of project goals like sustainability of water projects (Sawega 2015). In particular, management skills the study refers is management skills of CBWSOs leaders, water tariffs are collected from the community by CBWSOs and technical assistance is from CBWSOs which are in charge of managing water infrastructures.

1.3 Statement of the Problem

About 2 billion people around the world have limited access to safely-managed drinking water services, while 3.6 billion people do not have safely-managed sanitation services (United Nations World Water Development Report, 2023). In Tanzania, about 4 million people lack access to an improved source of water and 29 million lack access to improved sanitation (URT, 2022). In order to solve this persistent problem, the community needed water projects with greater infrastructural investments and good management systems. This paved a way for initiation of Community Based Water and Sanitation Organizations (CBWSOs) which are in charge of managing water projects. These community-based organizations have different responsibilities including collection of water fees from people in the community based on consumption and maintenance of infrastructures.

Numerous studies such as Olela, (2018) and Tafara, (2013) have highlighted the factors that contribute to the sustainability of water projects. For instance, Olela, (2018) identified that water tariffs and choice of technology influences sustainability of water projects while Tafara, (2013) pointed out stakeholders' participation and technology as the critical factors affecting sustainability of community based water projects. However, the studies by Cronk and Bartram, (2017) and Chumbula and Massawe, (2018) asserted that the less is known about the contribution of such CBWSOs on sustainability of water projects in Tanzania. Therefore, this study aimed to examine the contribution of CBWSOs towards achieving sustainability of water projects in Tanzania.

1.4 Research Objectives

This study was guided by the following general and specific objectives derived from the theory guiding the study:

1.4.1 General Objective of the Study

To examine the contribution of Community Based Water and Sanitation Organizations towards achieving sustainability of water projects in Tanzania.

1.4.2 Specific Objectives of the Study

- i. To assess the impact of management skills on sustainability of water projects in Tanzania
- ii. To examine the effect of water tariffs on sustainability of water projects in Tanzania
- iii. To examine the effect of technical assistance on sustainability of water projects in Tanzania

1.5 Specific Research Questions

The study was guided by the following specific research questions derived from the study's specific objectives:

- i. What is the impact of good management skills influencing the sustainability of water projects in Tanzania?
- ii. What is the introduction of water tariffs to water projects on influencing the sustainability of water projects in Tanzania?
- iii. What is the effect of technical assistance on influencing sustainability of water projects in Tanzania?

1.6 Significance of the Study

This study is profoundly important in knowledge addition on matters concerning sustainability of water projects especially in determining whether CBWSOs are worthy enough of being trusted by the government to take charge of water supply in rural areas and the whole management of the water projects. Different stakeholders including policy makers, academicians and researchers, and the community can benefit by the empirical evidence provided by this study.

1.6.1 Policy Makers

This study was important to the accomplishment of National water policy (2002) which aimed to develop comprehensive framework for sustainable development and management of Tanzania water resources. The National water policy also aimed to ensure that the community participate fully in planning, construction, operation, maintenance and management of community based domestic water supply schemes. This study showed the contribution of the community participation in management

of community-based water schemes through the CBWSOs which is necessary in achieving the National water policy goal of entrusting the community in water management.

1.6.2 Academicians and Researchers

Academicians and researchers can use the findings of this study to develop research problems for further investigation. To make it more supportive, at the end of this study the researcher suggested the areas for further study after realizing the issues that this study failed to cover.

1.6.3 The Community

This study can benefit people in the community as they are the main users of water sources managed by these organizations. The findings of this study were communicated to the community and hopefully responsible authorities are encouraged to use data from this study to address the weaknesses exposed for the benefit of the community. This is important in enhancing availability of water in year-round, continued improvement of the project and maintained project gains which are the indicators of sustainable water project.

1.7 Scope of the Study

This study was based on wards with water projects managed by CBWSOs in Pangani, Tanzania. These wards include Masaika, Mivumoni, Kibo, Mwera and Kwakibuyu. The study was based on three independent variables including management skills, water tariffs and technical assistance and one dependent variable which is sustainability of water projects.

1.8 Organization of the Study

This research report covers six chapters including introduction, literature review and research methodology, research findings, discussions of the findings and summary, conclusion and recommendations. Chapter one which is introduction covers background to the study, statement of the problem, research objectives and questions, significance of the study and organization of the study. Chapter two which literature review covers theoretical and empirical parts of literature review.

Chapter three which research methodology shows the methods to be deployed in order to accomplish the study purpose including research philosophy, research approach, research design, study area and population, sampling procedures and sample size, data collection methods, data analysis methods, validity and reliability as well as ethical consideration. Chapter four is research findings according to the study objectives, chapter five is discussions of the findings and chapter six covers the summary, conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This chapter covers theoretical literature review and empirical literature review. In theoretical literature review, the study presents the definition of key terms and reviews empowerment theory and theory of change which guides the current study. Empirical literature review involves the review of previous studies related to this study which has been conducted in Tanzania and overseas.

2.2 Definition of Key Terms

2.2.1 Water Tariffs

Water tariffs refer to amount of money charged for water paid by customers buying water (Olela, 2018). It is also referred to the price assigned to water supplied by the public entity generally for both freshwater supply and waste water treatment (Lupasa, 2020). This study adopts the definition by Olela, (2018) that water tariffs refer to amount of money charged for water paid by customers buying water.

2.2.2 Management Skills

Management Skills refers to using expertise in coordinating the efforts of people to accomplish desired goals and objectives using available resources efficiently and effectively. It comprises planning, organizing, staffing, leading or directing, and controlling an organization (a group of one or more people or entities) or effort for the purpose of accomplishing a goal (Tafara, 2013). It is also referring to certain attributes or abilities that an executive should possess in order to fulfil specific tasks in an organization (Daniel et al, 2022). Management skills is also defined as the

abilities and attributes that help people in leadership positions succeed and achieve the goals and objectives of an organization (Lofingo, 2019). This study will be guided by the definition by Tafara, (2013) that management skills refers to using expertise in coordinating the efforts of people to accomplish desired goals and objectives using available resources efficiently and effectively.

2.2.3 Technical Assistance

Technical Assistance refers to the process of providing targeted support to an organization with a development need or problem (Olela, 2018). It is also referring to any technical support related to repairs, development, manufacture, assembly, testing, maintenance or any other technical services (Tonga, 2017). Technical assistance is also defined as the act of sending experts into the field to teach skills and to help solve problems in their areas of specialization such as plumbing technicians in water projects (Kirenga et al, 2018). This study goes with the definition by Olela, (2018) that technical assistance refers to the process of providing targeted support to an organization with a development need or problem.

2.2.4 Water Project

A project is an undertaking that has an objective of meeting human needs and aspiration and has specific budget and timeframe (Tafara, 2013). Water project referring to facilities and operations, by design, alter the timing and amounts of water flows and thus water depth and velocities (Lofingo, 2019). It also refers to the act of making some area of land or water more profitable or productive or useful (Richard, 2022). This study adopts the definition of Richard, (2022) who defined water project as the act of making some area of land or water more profitable or

productive or useful.

2.2.5 Sustainability

Sustainability is the continuing ability of a project to meet the needs of its community and embraces the concept of doing this beyond the time of donor agency involvement (Brinkerhoff and Goldsmith, 1992). It is referring to the ability to maintain or support a process continuously over time (Daniel et al, 2022). Sustainability also refers to the act of fulfilling the needs of current generations without compromising the needs of future generations, while ensuring a balance between economic growth, environmental care and social well-being (Lupasa, 2020). the study adopts the definition by Lupasa, (2020) that sustainability refers to the act of fulfilling the needs of current generations without compromising the needs of future generations, while ensuring a balance between economic growth, environmental care and social well-being.

2.3 Theoretical Literature Review

This study was guided by Contingency Theory. Fred Edward Fieldler is the author of this theory. According to this theory, managers must consider all relevant factors when making decisions, concentrating on those that are most important to the present circumstance. Each construction project is unique and presents its own challenges; as a result, it must be managed in accordance with those unique qualities and the environment present at that particular moment (Sawega 2015). The contingency theory is conscious of this and makes an effort to pinpoint the precise techniques that will best meet the requirements of various projects. This theory acknowledges that there are a variety of external factors that can have an impact on the project's goals.

Financial resources, technology/technical help, management skills, and the external environment are among these variables, which are also regarded as contingent factors (Nobin, 2016). According to this research, contingent elements such as management abilities, financial resources from water tariffs collected from the community, and technical assistance all affect how well project objectives are met and how successfully water projects can be sustained. Project managers can also greatly lower project uncertainty by properly allocating these contingencies.

In 1958, Woodward put forth this behaviorist theory. The theory states that there are different methods for project management. The best managerial approach depends on a number of internal and external variables. Businesses should develop the best managerial system for that time period after taking into consideration the circumstances and situation the firm is in (Armstrong & Taylor, 2014). Thompson recognized achieving originality in an uncertain world as a major challenge for projects in his 1967 standard organization in action model. He asserts that initiatives seek particular results.

However, they have to work in a constantly changing environment that is full of unknowns, which makes it difficult for them to come up with the best plan that can be completely carried out to achieve the desired results. Despite having an open system, Thompson argues that projects have little control over their surroundings because it is unpredictable, (Cole & Kelly, 2011). In order to guarantee the community's access to water for a very long time, sustainability is a common goal of water projects. (Aashiq, et al., 2020). As a result, having excellent management with pertinent project management skills is crucial because they can develop a sound

strategy for dealing with the external environment, which endangers the sustainability of water projects.

Contingency theory was adopted in different studies such as that of Islam & Hu, (2012), Agusioma, (2018) and Lazarus, (2014). Islam & Hu, (2012) asserted that, according to the contingency theory, a business or project needs to create clear decisions and actions that pertain to particular environments that may lead to a match. Agusioma, (2018) added that, the theory asserts that in addition to its shareholders, the enterprise also owes obligations to its partners. These stakeholders include, but are not limited to, the following: workers, suppliers, customers, communities, creditors, governmental and regulatory agencies, as well as current and potential investors. Each of these parties has a substantial impact on the project's performance.

Additionally, Lazarus, (2014) asserted that the theory's critics claim that it fails to explain how to proceed when the leader and the scenario at hand do not coincide. They also claim that it does not explain why some leaders with specific leadership philosophies succeed in some situations but fail miserably in others. According to the theory, the project management team should handle any problems that endanger the achievement of project objectives. However, the theory does not outline the management actions that should be done to address the external environmental factors that jeopardize project objectives, (Toku, 2014). However, the theory was applicable to the current study because it assess how contingent factors including management skills, fund generated through water tariffs and technical assistance impacts sustainability of water projects.

2.4 Empirical Literature Review

This part reviews previous studies related to this topic conducted in order to observe what has been investigated by other researchers and what has not been addressed which was the starting point in this study. This section is organized according to the objectives of the study.

2.4.1 To Assess the Impact of Management Skills on Sustainability of Water Projects

Daniel et al (2022) carried out a study on factors related to the functionality of community based rural water supply and sanitation programs in Indonesia. Regression analysis was used in the research to examine quantitative data gathered through questionnaire. The results of this research showed a positive correlation between effective management and the efficiency of rural water supply and sanitation programs. Additionally, the likelihood of completely working increases to 98% when strong management, sound finances, and household ties rather than communal ties are present. Thus, the community should ensure that the leaders in charge of managing community based water supply programs have rightful skills of attending their responsibilities.

Aashiq et al (2020) conducted a study on community based management strategies in sustainability of rural water supply schemes in Pakistan. This essay examines the elements of community-managed rural water supply systems that promote sustainability. The research concluded that the sustainability of rural water supply schemes depends on strong community leadership and administration. The synthesis demonstrated that in order to make RWSS sustainable, community management

requires adjustments in terms of external factors, such as institutional support, which includes financial and technical support, trainings, and administrative assistance.

Persoon (2016) conducted a study on factors influencing community based programs including water projects in Nepal. The main objective of this study was to assess the factors influencing community based programs including water projects in Nepal. This study indicated that good management of water projects is one among the factors that has enormous contribution on sustainability of water projects. The study also indicated that giving priorities to community leaders is vast important because they are familiar with the community and can mobilize the community participation in water projects from the design to the implementation stages. It was frequently stated that having a leader who is well-known in the neighbourhood increases effectiveness. The listed duties of the leader included encouraging and raising support, inviting others to participate and join the program, planning meetings, and assisting with attendance at the program.

Muriuki and Severina (2021) conducted a study to explore the determinants of effective implementation of water, sanitation and hygiene projects in Kenya: the case of Kibera Slums. This study looks at how project managers' abilities have affected how well these projects have been carried out in order to ensure sustainability and beneficiary happiness. Results came from a sample of 208 respondents drawn from a population of 435 using a stratified random sampling method. The results demonstrated that competent project leaders and staff favorably impacted the projects' implementation. The paper concludes that when implementing water initiatives, it's critical to select qualified leaders and hire qualified staff.

Nyamutera and Warue (2021) examined the factors influencing development projects sustainability in Mercy Ministry International projects in Rwanda. The investigation used a descriptive research design. Project managers and employees of the project team from Mercy Ministry International Rwanda were the unit of analysis and observation in the Rubavu neighborhood. 95 people were surveyed for the census. Utilizing surveys, primary data was gathered. Inferential statistics were used by the researcher to determine how closely the factors under study were related to one another. The researcher came to the conclusion that organizational leadership is crucial in promoting decision-making, creating policies, and spreading best practices for project management throughout the company.

Masombe and Omwenga (2020) conducted a study on the Factors Hindering Sustainability of Water Projects in Makueni County in Kenya: A Case Study of Kwing'ithya Kiw'u Project. In this study, a descriptive survey design was used. Residents of the two wards, key informants, including the self-help group that collaborated with the NGO, and local sub-chiefs of the seven sub-locations within the two wards made comprised the research population. To contact the respondents, a household survey was performed. Purposive identification of the subject matter or key informants across pertinent local institutions was then carried out.

The study employed both probability-based and non-probability sampling strategies. In this study, questionnaires were given to participants to help obtain quantitative data from them. In order to help the researcher describe the data, descriptive statistical techniques (SPSS V.17.0 and Excel) were used to examine the data. This study found that leaders' lack of technical understanding has a detrimental effect on

the sustainability of water projects. It is vast important to enhance leadership and technical skills of leaders through training, seminars and workshops so as to achieve sustainability of water projects.

Lupasa (2020) conducted a study on factors affecting sustainability of donor-funded projects in rural areas, a case of Saman Corporation's water projects in Kibaigwa, Dodoma in Tanzania. The design used in the study is a descriptive research design. The research was conducted in the Kongwa district's Kibaigwa constituency. Both the convenience sampling technique and the purposive sampling technique were used in the research as sampling methods. The study used three different methods to gather data: questionnaires, interviews, and document reviews. The results demonstrate that donor-funded water projects like the Kibaigwa ward's Water Supply Project by Saman Corporation are not sustainable because of ineffective leadership and incompetent employees and contractors. As a result, training for project managers and staff is required, as is a greater involvement of the government in project execution.

Lofingo, (2019) conducted a study entitled "Public water supply and sanitation authorities for strategic sustainable domestic water management: A case of Iringa Region in Tanzania". This study assessed the accuracy of water management in rural authorities compared to urban authorities. The findings indicated that urban authority are managing water projects more accurately than rural authorities. Even based on quality of service delivery, urban authorities provides quality services and affordable than rural areas. The study recommended that rural water supply management must learn several practices realized in urban supplies for the betterment of services for

the majority of the users.

Tonga (2017) conducted a study to assess the implications of Technology on Sustainability of Rural Water Supply (TSRWS) in Dodoma- Tanzania. The research confirms that policies in the rural water supply sector have not been well implemented in many developing nations, including Tanzania. The results showed that public sector organizations in Tanzania had to deal with bad corporate governance when making decisions and putting quality, sustainable water delivery systems into place.

Kirenga, et al., (2018) conducted a study on the influence of water fund to sustainability of community managed rural water supply projects in Moshi District, Tanzania. One of the aims of this study was to determine the impact of effective management of water projects on sustainability of water projects. The study used purposive sampling to sample 157 community water users who were interviewed. The study findings indicated that there is a strong relationship between effective management of water projects by the leaders and sustainability of water projects. Thus, the study recommended regular review of effectiveness of management skills of leaders involved in managing water projects.

2.4.2 To Examine the Effect of Water Tariffs on Sustainability of Water Projects

Olela, (2018) conducted a study on factors influencing sustainability of water supply projects for rural communities in Arid and Semi-Arid lands. This study was conducted at Garbatula Sub County in Isiolo County, Kenya. Among the specific

objective of this study was to identify the influence of water tariffs on sustainability of water supply projects in rural settings. The study findings indicated that water tariffs have positive associations with sustainability of water projects. In spite of the positive results, the study indicated that sustainability of water supply projects are hindered by lack of spare parts and lack of involvement and participation of stakeholders in the projects. The study also indicated that household consumption should be considered in water tariff settings.

Abanyie et al (2023) conducted a study to identify the factors for improved water supply in Doba and Nayagnia in Ghana. Data were gathered through the use of a questionnaire, and after inferential analysis, association analysis was produced. The results of this research showed a strong, significant correlation between water tariff and water supply sustainability. The study recommended that money collected from the community through water tariffs should be transparent and used for continuous improvement of the projects.

Armstrong et al ((2022) conducted a study on piped water revenue and investment strategies in Rural Africa. More than 3,900 monthly records from operators in Ghana, Rwanda, and Uganda were examined for this research in order to model revenue trends for new service area archetypes. The findings show complementary revenue patterns between on-premises and off-premises connections, with volumetric revenue determined by tariff level rather than connection type and waterpoints with the largest dispensing capacity producing the most aggregate revenue. When tariff level is controlled, the prepaid credit payment method—which is increasingly pushed as a way to improve revenue collection efficiency—does not

offer any revenue benefits over the pay-as-you-fetch and monthly billing methods. This suggests that the results may be applicable outside the study domain. These patterns are common at multi- and single-country scales and across service areas where public and enterprise-led investment approaches to infrastructure development are adopted. Off-site piped water can help promote revenue and equity objectives, but more research is required to fully understand the trade-offs of prepaid credit systems.

Enqvist and Oyen (2022) investigated what residents in three different socioeconomic contexts view as fair water tariffs 1 year after the crisis. This study was conducted in Cape Town, South Africa. The study explained five different viewpoints on fairness using the Q method: "the Insurer," "the Individualist," "the Bureaucrat," "the Humanitarian," and "the Prepper." The study contended that these can aid in differentiating between various conceptions of what justice entails and what is necessary to advance it. It was illustrated this by looking at how perspectives may have been formed by experiences within and after particular communities under the apartheid state's discriminatory segregation policies.

The study explored how the complicated layers of poverty, inequality, mistrust, privilege, and discrimination might result in different experiences and ideas of who should pay for and profit from water services using distributive, procedural, and interactional interpretations of fairness. The study also considered the advantages of tariffs that prioritize cost recovery and resource conservation over social requirements, as well as the dangers this presents for the expansion of informal settlements in climate-stressed cities of the global South.

Julius and Kalunda (2021) conducted a study to establish the influence of water pricing on financial sustainability among water service providers (WSPs) in Kenya. The study used an explanatory sequential mixed design and a pragmatism research methodology. The 88 registered small to very large WSPs made up the target group, which consisted of seven senior managers from each. The sample consisted of four managers per WSP who were both responsible for the particular inputs into water pricing and information pertaining to financial sustainability. While qualitative data was gathered through interviews with industry specialists, quantitative data from the interviewees was obtained using a structured questionnaire.

Data was analyzed both descriptively and inferentially using the mean, standard deviation, and regression analysis with ordinary least squares. (OLS). According to the study's results, water pricing does not statistically significantly affect the ability of WSPs in Kenya to maintain their financial viability ($F=1.113$ (1,250df), $P=0.296$; $R=0.134$, $R^2=0.018$, $F=0.122$). According to the results, it is necessary to confirm that the current pricing methodology is adequate for achieving its four main goals, namely equitable access, efficiency, simplicity, and full cost recovery, and to review it in order to protect WSPs from changes in input costs while also ensuring its adaptability to other external shocks.

Aashiq et al (2020) conducted a study on community based management strategies in sustainability of rural water supply schemes (RWSS) in Pakistan. The investigation of the variables influencing the sustainability of water initiatives was one of the study's goals. This research has identified one of the key elements influencing the sustainability of water projects as water tariffs. This is so that funds

from water tariffs can be used to maintain water facilities and keep rural water projects improving.

Lupasa (2020) conducted a study on factors affecting sustainability of donor-funded projects in rural areas, a case of Saman Corporation's water projects in Kibaigwa, Dodoma in Tanzania. The study used a descriptive research approach as its methodology. The research was conducted in the Kongwa district's Kibaigwa constituency. Both the convenience sampling technique and the purposive sampling technique were used in the research as sampling methods. The study used three different methods to gather data: questionnaires, interviews, and document reviews. The results demonstrate that donor-funded water projects like Saman Corporation's Water Supply Project implemented in Kibaigwa ward are not financially viable because inadequate money was raised from water tariffs, making them unsustainable.

Komakech et al (2020) conducted a study to find out why prepaid technologies are not a panacea for inclusive and sustainable rural water services in Tanzania. This paper assessed the performance of three different cases where prepaid technologies were used in collection of water tariffs in Tanzania. The results showed that while the technologies used can make collecting water taxes simpler, they do not guarantee the provision of fair and sustainable water services. The initial cost of the prepaid system is frequently covered by donors and is not recovered, so the idea of cost recovery is skewed in this situation. Along with the technology, a solid institutional capability and knowledge are also needed. So, rather than improving expense recovery, the technology that is being promoted actually increases the burden on

water users.

Kirenga, et al., (2018) conducted a study on the influence of water fund to sustainability of community managed rural water supply projects in Moshi District, Tanzania. The study used purposive sampling to sample 157 community water users who were interviewed. After data analysis through thematic analysis, the study found that water fund collected from the community based on consumption has enormous contribution on sustainability of water projects, however, money collected were inadequate to cover operation and maintenance cost.

Cronk and Bartram, (2017) conducted a study on factors influencing water system functionality in Nigeria and Tanzania. In this study, monitoring data were analyzed using regression and Bayesian networks (BNs) to explore factors influencing the functionality of 82,503 water systems in Nigeria and Tanzania. The study results indicated that fee collection is associated with higher functionality in Nigeria. In the same way, the study results indicated that monthly collection of fees is associated with higher functionality than collection of fees when the system breakdown occurs. With these results, there is no doubt that water tariffs have the strong positive effect to functionality of water projects as such tariffs are used for maintenance of project infrastructures as well as continuous improvement of the water projects.

2.4.3 To Examine the Effect of Technical Assistance on Sustainability of Water Projects

Olela (2018) examines the impact of technology selection on water supply projects and found that technology selected plays a big role towards attaining sustainability

of water supply project. This study was conducted at Garbatula Sub County in Isiolo County, Kenya. This study revealed that technical assistance is highly needed in maintaining the water project infrastructure that is why there are local authorities with the duty of managing these projects. The water projects needs time to time maintenance because there different kind of breakdowns that hinder sustainable service delivery. According to reports, leaky or damaged pipes are the main reason for breakdowns, followed by mechanical problems with generators. It was discovered that the dearth of spare parts stores and the inexperienced local experts made repairs take longer. The study recommended that continuous improvement of the projects is highly needed because solving the problem after occurrence of breakdown takes time to repair.

Masombe and Omwenga (2020) conducted a study to establish factors hindering sustainability of water projects in Makueni County in Kenya. The study found that the project lacked the technological know-how to be managed and the human resources to be sustained. Additionally, very little technology was used in the management of water initiatives, which hurt their ability to last. The study suggests that technical support be given to ensure that the projects are well-maintained and improved constantly to ensure sustainability.

Kativhu et al (2021) conducted a study on sustainability of water facilities under community based management in Zimbabwe. The research was cross-sectional in design. Focus group discussions, key informant interviews, home surveys, and an observation checklist were used to gather data. Thematic analysis was used to examine qualitative data while SPSS and Microsoft Excel were used for quantitative

analysis. Results indicated that the water facility's age, how frequently preventive maintenance is performed, and the presence of outside support are the technical factors that are affecting sustainability. Age and breakdown frequency had a positive linear association, according to regression analysis, and the likelihood of experiencing a breakdown dropped as the frequency of preventive maintenance rose. The research suggests teaching technical skills and CBM to user communities.

Richard (2022) conducted a study on examining the influence of strategic technology adoption practice on the sustainability of community water supply projects in marginalized Kenya. An approach to descriptive research was used in this work. 302 water project employees in total were taken into consideration. Based on the 1970 Krejcie and Morgan table, a selection of 169 respondents was chosen. A structured likert-rated questionnaire was used to gather the data, and a straightforward random sampling procedure was used. Both descriptive and inferential statistical analyses were used in the study.

The results of showed that $r=0.119$. This suggests a beneficial and equitable connection between strategic technology adoption practices and the sustainability of community water supply initiatives in marginalized Kenya. Additionally, R^2 was 0.114, indicating that strategic practices for technology adoption account for 11.4% of the variations in the viability of community water supply programs in marginalized Kenya. Therefore, in marginalized Kenya, strategic technology adoption practice has a big impact on the longevity of community water supply initiatives.

Aashiq, et al., (2020) conducted a study on community based management strategies in sustainability of rural water supply schemes (RWSS) in Pakistan. This essay examines the community-managed RWSS's sustainability considerations. According to the research, project staffs' technical know-how is crucial to extending the life of rural water supply schemes. It is necessary to provide project employees with training in order to ensure their technical competency. This is crucial because it makes rural water supply systems more sustainable.

Muriuki and Severina (2021) to explore the determinants of effective implementation of water, sanitation and hygiene projects in Kenya: the case of Kibera Slums. In order to ensure sustainability and beneficiary satisfaction, this paper investigates the effect staff competence of project teams has had on the efficient execution of these projects. Results came from a sample of 208 respondents drawn from a population of 435 using a stratified random sampling method. Results indicated that staff competence had a favorable impact on how the initiatives were implemented. Therefore, the article draws the conclusion that it's critical to hire qualified personnel when carrying out technical projects like water projects.

Komakech, et al., (2020) conducted a study to find out why prepaid technologies are not a panacea for inclusive and sustainable rural water services in Tanzania. This study evaluated the effectiveness of three distinct uses of prepaid technologies in Tanzania. The research discovered that while technology makes water revenue collection easier, it cannot deliver equitable and sustainable water services. This is due to the fact that substantial institutional capability and expertise are needed in addition to the technology.

Lupasa (2020) conducted a study on factors affecting sustainability of donor-funded projects in rural areas, a case of Saman Corporation's water projects in Kibaigwa, Dodoma in Tanzania. The study used a descriptive research approach as its methodology. The research was conducted in the Kongwa district's Kibaigwa constituency. Both the convenience sampling technique and the purposive sampling technique were used in the research as sampling methods. The study used three different methods to gather data: questionnaires, interviews, and document reviews. The results demonstrate that the absence of technical proficiency among project managers, employees, and contractors prevents donor-funded water projects from being sustainable, such as Saman Corporation's Water Supply Project implemented at Kibaigwa ward. As a result, the research suggests offering technical support for maintaining project infrastructures as well as training to improve technical skills among project staff and leaders.

Chumbula and Massawe, (2018) conducted a study on the role of local institutions in the creation of an enabling environment for water project sustainability in Iringa District, Tanzania. In this study, the results indicated that local institutions' management of water projects through provision of technical assistance is very critical as it enhance the life span of the projects. It was revealed that technical aspects such as maintenance of project infrastructures, availability of spare parts and technical expertise of operators are very important factors towards achieving sustainability of water projects. Therefore, local governments, donors and communities should make sure that technical aspects and regular follow-ups, as well as capacity building among members of the community and water user associations

become an integral part of any water project for the realisation of sustainability.

Tonga (2017) conducted a study to assess the implications of Technology on Sustainability of Rural Water Supply (TSRWS) in Dodoma- Tanzania. The research confirms that policies in the rural water supply sector have not been well implemented in many developing nations, including Tanzania. The research discovered that lack of effective participation between external actors (donors, agencies), and local actors, causes water technology to fail to maintain rural water supply projects. The study emphasize on provision technical assistance in infrastructure maintenance so as to ensure contious improvement of the project and finally attain sustainability of water projects.

2.5 Research Gap

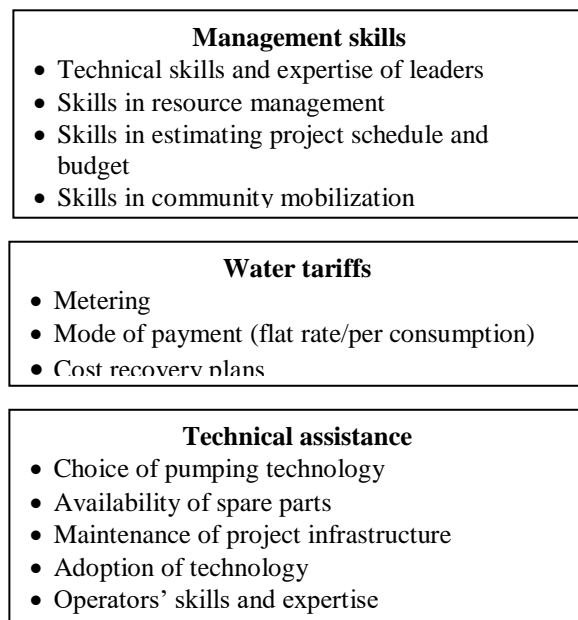
The studies such as Olela, (2018), Tafara, (2013), Lofingo, (2019) and Chumbula and Massawe, (2018) highlighted the factors influencing sustainability of water projects but none have spotlighted about the role played by community based organizations like CBWSOs in management of water projects towards achieving sustainability of water projects. Cronk and Bartram, (2017) revealed that there is strong correlation between water system functionality and administration units whether it is the district administration, government water administrative agencies (like RUWASA in Tanzania) or these CBWSOs which are the case studies in this current study. This shows that there is a potential that CBWSOs could play a great role in the efforts towards achieving sustainability of water projects in Tanzanian rural settings. Because of this oversight, it was vast important to examine the contribution of CBWSOs towards achieving sustainability of water projects in rural

settings, taking Tanzania as a case study.

2.6 Conceptual Framework

This study envisaged that CBWSOs have enormous contribution towards achieving sustainability of water projects in terms of availability of water in year-round, continuous improvement of project and maintained project gains and so on as presented in Figure 2.1. On the side of independent variable, the study measured the CBWSOs' contributions through management skills, collection of water tariffs and technical assistance. Sustainability of water projects which is the study's dependent variable was indicated by availability of water in year-round, continued improvement of the project, maintained project gains, reliable water source, availability of resource for project, level of people empowerment and environmental protection and conservation (Daniel et al, 2022). Figure 2.1 below is the study's conceptual framework.

Independent variables



Dependent variables

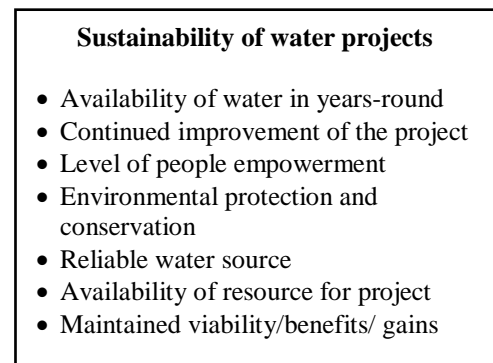


Figure 2.1: Conceptual Framework

Source: Researchers' own construct (2023).

2.7 Theoretical Framework

2.7.1 The Relationship between Management Skills and Sustainability of Water Projects

Management skills are one of the predictor variables of sustainability of water projects (Lupasa, 2020). It has been identified that CBWSOs are in charge of managing water projects in Tanzania, hence, the leaders of such organizations should have perfect skills on managing water projects, as a result it lead sustainability of water projects. The required skills that managers should have include technical skills and expertise of leaders, skills in resource management, skills in estimating project schedule and budget and skills in community mobilization (Aashiq, et al, 2020). Therefore, this study hypothesized that; *management skills have positive and significant influence on sustainability of water projects.*

2.7.2 The Relationship between Water Tariffs and Sustainability of Water Projects

Community based water and sanitation organizations are in charge of collecting water tariffs (Kirenga et al, 2018). The water tariffs are used for maintenance of water project infrastructures and continuous improvement of water projects which in turn it improves the life span on the project infrastructures (Armstrong et al, 2022). This in turn is vast important to sustainability of water projects. in this case, this study hypothesized that; *water tariffs have positive and significant influence on sustainability of water projects.*

2.7.3 The Relationship between Technical Assistance and Sustainability of Water Projects

Provision of technical assistance by CBWSOs is vast important for sustainability of

water projects as it ensures that the projects are well managed and maintained (Kativhu, et al, 2021). The CBWSOs are required to employ the artisans who are in charge of conducting maintenance of water infrastructures, procure the required spare parts and assist the community in the process of technology adoption (Komakech, et al., 2020). This plays a great role in improving the life span of the water project infrastructures and ensures that the infrastructures are always in a good shape (Cronk and Bartram, 2017). This in turn leads to sustainability of water projects. In this point, this study hypothesized that; *technical assistance have positive and significance influence on sustainability of water projects.*

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Overview

This is the practical part of the study which covers the research design, study area, study population, sample size, sampling procedures, data collection methods and plan for data analysis.

3.2 Research Philosophy

A research philosophy is a belief about the way in which data about a phenomenon should be gathered, analysed and used. This study adopted positivist research philosophy in order to achieve its objectives. Positivists believe that reality is stable and can be observed and described from an objective viewpoint (Levin, 1988), i.e. without interfering with the phenomena being studied. In order to find patterns in and establish connections between some of the components of the social environment, this frequently entails manipulating reality with variations in just one independent variable.

On the basis of the previously seen and explicated realities and their linkages, predictions can be made. This research philosophy is appropriate for the study because there is enough data from previous studies that can be used to develop variables and establish a relationship between variables and foremost it allows the study use empirical data to test or refute hypotheses. As Trochim and Donnelly (2001) give that; positivism is the phenomenon, which can produce knowledge since it is associated with empirical testing.

3.3 Research Approach

In this study a quantitative research approach was used. A quantitative approach involves designing questions that can be quantified in further numbers and data collected through surveys (using survey questionnaires) (Creswell, 2014). This approach was applied in request to permit the utilization of various information assortment techniques for gathering information and examination. The methodology additionally permitted assortment of a more extensive scope of information for more profound and clear comprehension of the issue. Quantitative approach is related with positivist research philosophy which allows the study use empirical data to test or refute hypotheses.

3.4 Research Design

The study used the descriptive design that incorporates gathering data that depicts events and subsequently figures out, coordinates, and portrays the data assortment. As indicated by Sarantakos (2004), descriptive research design can create a lot of reactions from a wide scope of individuals. Likewise, this plan gives significant and exact image of occasions and tries to clarify individuals' insight and conduct based on information assortment (Korith, 2004). This design enabled the study to achieve its objective which is to examine the contribution of CBWSOs towards achieving sustainability of water projects.

3.5 Study Area

It is very important for any researcher at the planning stage to clearly specify and define the area under which the research will be conducted (Cohen *et al.* 2007). Tanzania was the study area suitable for the accomplishment of study objectives.

This study was specifically conducted at the district's RUWASA offices and the wards with water projects managed by CBWSOs where respondents were easily contacted. All necessary information concerning the contribution of CBWSOs towards achieving sustainability of water projects was successfully gathered at the selected study area. Tanzania was chosen for this study because the district had well established CBWSOs which are operating hand to hand with the government, hence it was easy to contact them and provide useful information needed to accomplish the study objectives.

3.6 Population of the Study

Study population is a group of individuals selected on the basis of inclusion and exclusion criteria which relate to the variables being studied (Mugenda and Mugenda, 2003). The study population in this study is 48,567 comprising of RUWASA staffs, CBWSOs' staffs and the community members. Through the selected study population the researcher gathered reliable information as the community members and staffs of RUWASA and CBWSOs have sufficient information concerning the way CBWSOs contribute to the sustainability of water projects in Tanzania.

3.7 Sampling design

3.7.1 Sampling Frame

This is the list of all items in the population. The sampling frame in this study was 48,521 community members, 21 RUWASA officials and 25 CBWSOs' staffs in Tanzania (Tanzania Council, 2023). These community members are regarded as beneficiaries of water projects implemented in Tanzania. The RUWASA officials

includes all staffs stationed in RUWASA offices in Tanzania. Moreover, CBWSOs staffs include the officials of such community based organizations available in Tanzania.

3.7.2 Sampling Procedure

This study used stratified random sampling method in sample selection. This is an unbiased sampling method of grouping heterogeneous populations into homogenous subsets then making a selection within the individual subset to ensure representativeness (Andale, 2014). This type of sampling method is useful in this study because respondents can be grouped in similar groups and being randomly selected. Through this sampling method, study population was grouped into three groups comprising community members, RUWASA officials and CBWSOs' staffs. After grouping respondents into homogenous subsets, random selection was done to reach the required number of samples that was included in this study.

3.7.3 Sample Size

Sample size is a number of sampling units which are to be included in a sample (Kothari, 2004). Sample size should be optimum. The sample size of 100 respondents was optimum in gathering reliable information regarding the topic under study. The study used Slovin's formula (Slovin, 2007) to calculate sample size and the workings are as shown below.

$$n = N / (1 + N(e)^2)$$

Whereas: n = sample size; N = Population of the study; e = Error term

Particulars: N = 48,567; e = 10% error term; n = ?

Thus,

$$n = 48,567 / (1 + 48,567 (0.1)^2)$$

$$n = 48,567 / (1 + 48,567(0.01))$$

$$n = 48,567 / (1 + 485.67)$$

$$n = 48,567 / 486.67$$

$$n = 99.79$$

$$n = 100$$

3.8 Data Collection Methods

In this study, data was collected through questionnaire. In this technique a set of written questions was prepared and administered by the researcher in order to minimize errors that could be caused by self-administration of the questionnaires by respondents. Questionnaire method was adopted in order to collect data from respondents of this study. The questionnaires included closed ended questions in order to have a room to collect quantitative data. Likert scale questions including 5 responses which are 1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree was used in quantitative data gathering.

3.9 Data Analysis

In this study, Statistical Package for Social Science (SPSS) was used to analyse quantitative data collected using questionnaires, in which descriptive statistics and multiple regression analysis was derived. Descriptive statistics including frequencies and percentages was determined and presented in tables and charts. Through descriptive analysis, demographic profile of respondents including age, sex, education level, marital status and occupation was analysed and demonstrated in the findings. In addition, descriptive analysis was used to examine the contribution of

CBWSOs on sustainability of water projects. This study also run correlation analysis and multiple regression analysis through SPSS (Version 20.0) in order to determine the association between the study's independent variables (including management skills, water tariffs and technical assistance) and dependent variable which sustainability of water projects.

3.9.1 Model of Analysis

This study was guided by the multiple regression equation model of analysis. This model was as follows:

$$Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

Where: Y= Sustainability of water projects

β_1 , β_2 and β_3 are constants or unknown parameters

X1= Management skills

X2= Water tariffs

X3= Technical assistance

e = Error term

3.9.2 Model Specification

Model specification is the process of determining which independent variables to include and exclude from the regression equation. For a model to be best the adjusted R square and predicted R square should have large values and the p-value less than less than 0.05 indicates that the model is statistically significance. Hence, the study included variables that after regression analysis gave us the model with large values of R square and predicted R square and p-value less than 0.05.

3.9.3 Test for Regression Assumptions

This study tested for auto-correlation assumption, normality assumption and multicollinearity. In the test for auto-correlation assumption, Durbin-Watson values should range between 1.5 and 2.5 (Field, 2009). Skewness and Kurtosis tests were derived to ascertain the normality statistics. Field (2009) indicated that the values of skewness and kurtosis lying in between -2 and +2 the data is considered normally distributed and hence satisfactory for interpretation. Multicollinearity test was done in order to measure if the predictor variables are highly correlated with one another. The VIF value above 10 and tolerance less than 0.1 means that the model suffers from multicollinearity.

3.10 Reliability

Reliability means the extent to which results are consistent over time (Mugenda & Mugenda, 2003). Cronbach's Alpha Test was used to measure the reliability of data. It was important to measure the reliability of these items so as to be assured that the study variables measure the same underlying hypothesis. The study used the suggestions of George and Mallery (2003) to define the Cronbach's Alpha Test scores whereby $\alpha > 0.9$ (excellent); $\alpha > 0.8$ (Good); $\alpha > 0.7$ (Acceptable); $\alpha > 0.6$ (Questionable); $\alpha > 0.5$ (Poor) and $\alpha < 0.5$ (Unacceptable). The reliability test scores after data collection, entry and analysis are as presented in Table 3.1.

Table 3.1: Reliability Test Scores

Variable	Cronbach's Alpha	Cronbach's Alpha based on standardized items	Number of items
Sustainability of water projects	0.808	0.814	7
Management skills	0.840	0.844	4
Water tariffs	0.885	0.886	5
Technical assistance	0.851	0.854	5

3.11 Validity

Validity of the data in all cases is there to determine whether the research indeed achieved what was intended. In order to ensure the validity of data, the researcher conducted a pilot study in order to test the tools for data collection before the actual data collection. In this study, before the actual data collection, questionnaires were administered to 10% of the samples so as to test the relevance of the questions. Through this, the researcher determined that respondents accurately understand the questions and they understood them in the same way.

3.12 Ethical Consideration

According to Creswell (2017), ethical consideration is a basic principle in ethical issues which includes treatment of participants or respondents as well as observing respect and justice. The researcher requested a permission letter from Open University Tanzania in order to get the permission from RUWASA Tanzania in order to authorize the researcher to collect data in the selected area. Respondents remained anonymous; participants' responses were reported using pseudonyms rather than their actual names. Participation in this research was voluntary with informed consent. The participants were informed about the purpose of this study that it is only for academics requirements and not in any other way that would cause harm to respondents. Also other people's works and all the citations used are acknowledged using the APA referencing style.

CHAPTER FOUR

RESEARCH FINDINGS

4.1 Overview

This chapter describes the findings in accordance to the study objectives which are; to assess the impact of management skills on sustainability of water projects in Tanzania, to examine the effect of water tariffs on sustainability of water projects in Tanzania and to examine the effect of technical assistance on sustainability of water projects in Tanzania. This chapter presents the findings obtained through descriptive statistics and inferential analysis including correlation analysis, ANOVA and multiple regression analysis.

4.2 Characteristics of Respondents

This section describes the demographic characteristics of respondents included in this study. Four demographic variables were included. This includes gender of respondents, age, education level and occupation.

4.2.1 Gender

This section describes respondents' distribution based on gender. In this study, male respondents accounted for 57% of the total number of respondents who participated in this study which is equivalent to 57 respondents. On the other side, female respondents accounted for 43% of respondents which is equivalent to 43 respondents, which is slightly lower than the number of male respondents who participated in this study. Figure 4.1 below illustrate these findings graphically.

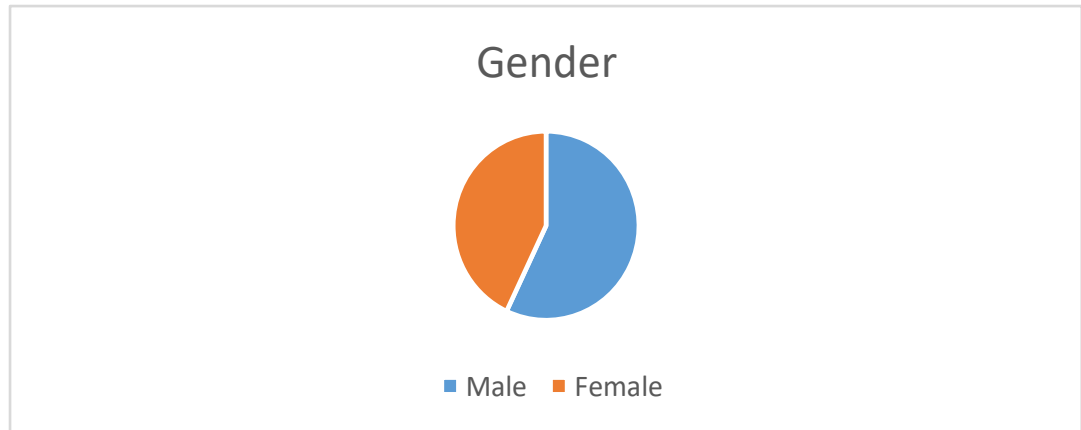


Figure 4.1: Gender

4.2.2 Age of Respondents

About age of respondents, it has been found that 36 (36%) of respondents which is the highest percentage were aged 29-39 years, followed by 28 (28%) who aged 40-50 years. The rest of respondents were aged 18-28 years [19(19%)], followed by those aged 51 years and above [17(17%)]. Figure 4.2 below illustrate these findings graphically.

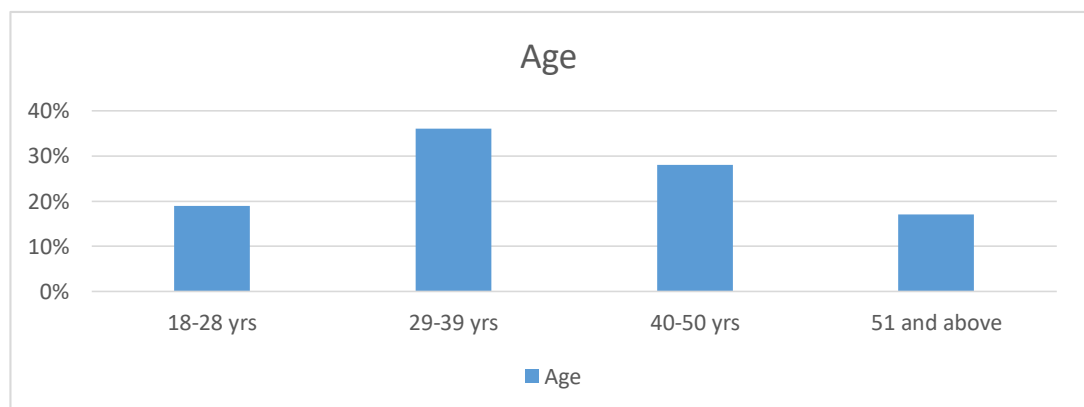


Figure 4.2: Age of Respondents

4.2.3 Education Level

This section depicts the distribution of respondents according to the level of education. The findings of this study indicated that 31% of respondents which is

equivalent to 31 respondents possess bachelor degree, followed by 25% which is equivalent to 25 respondents with certificate/diploma. The rest of respondents had postgraduate degree [18(18%)], followed by those who reached secondary level of education [17(17%)], while 9% which is equivalent to 9 respondents had primary education. Figure 4.3 illustrate these findings graphically.

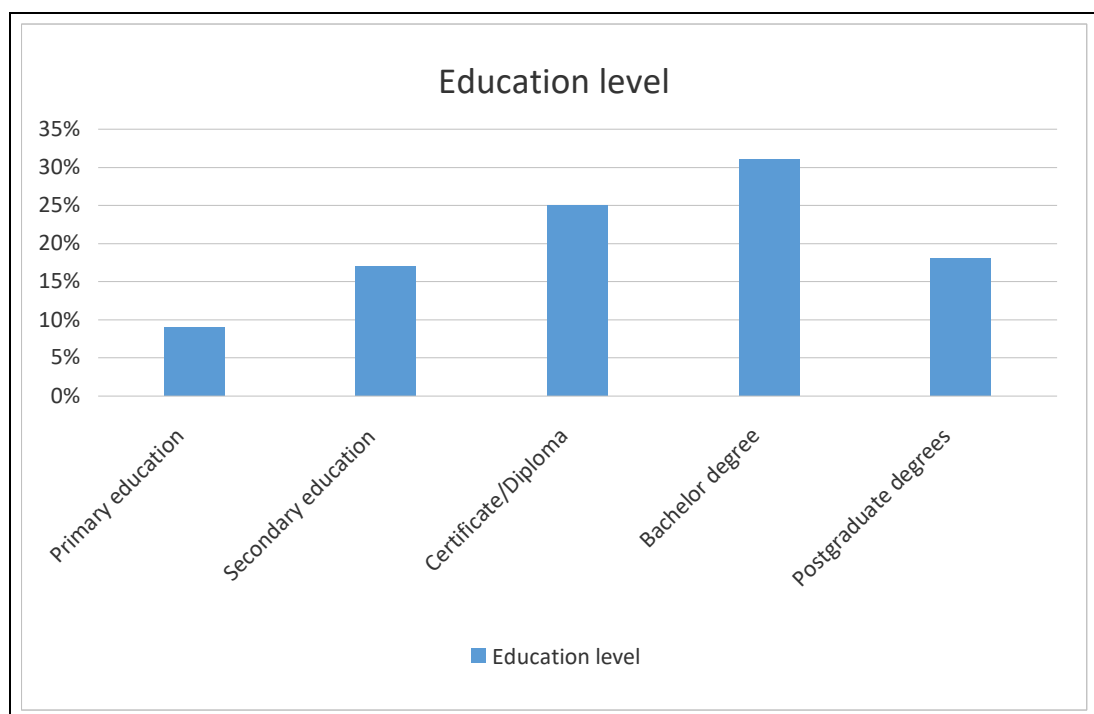


Figure 4.3: Education Level

4.2.4 Occupation

This section describes the kind of occupation of respondents who participated in this study. The findings indicated that 32% of respondents which is equivalent to 32 respondents were entrepreneurs, followed by those employed in private sector [27(27%)]. The rest of respondents were employed in public sector [23(23%)], while 18% of respondents which is equivalent to 18 respondents were farmers. Figure 4.4 below illustrate these findings graphically.

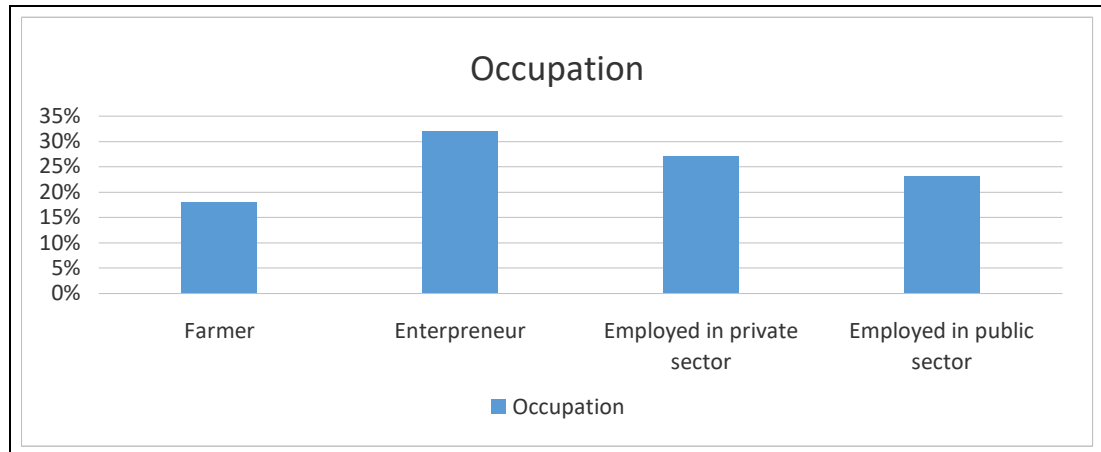


Figure 4.4: Occupation

4.3 Reliability Test Results

This study used Cronbach's Alpha to test reliability of the study. The findings indicated that sustainability of water projects has Cronbach's Alpha value of 0.808, management skills has Cronbach' Alpha coefficient of 0.840, water tariffs has Cronbach's Alpha value of 0.885 and technical assistance has Cronbach's Alpha coefficient of 0.851. The Cronbach's Alpha results in all variables are good as the rule of George and Mallerly (2003) suggested that a > 9 (excellent); a > 8 (Good); a > 7 (Acceptable); a > 6 (Questionable); a > 5 (Poor) and a < 5 (Unacceptable).

Table 4.1: Reliability Test

Variable	Cronbach's Alpha	Cronbach's Alpha based on standardized items	Number of items
Sustainability of water projects	0.808	0.814	7
Management skills	0.840	0.844	4
Water tariffs	0.885	0.886	5
Technical assistance	0.851	0.854	5

Source: Research Data, (2023).

4.4 Descriptive Statistics

This part presents the findings after running descriptive statistics through SPSS. The findings obtain opinions of respondents on all study variables including management

skills, water tariffs, technical assistance and sustainability of water projects.

4.4.1 Respondents' Opinions on Management Skills of CBWSOs' Leaders

The findings of this study indicated that 37% of respondents which is the highest percentage agreed that CBWSOs have leadership skills in community mobilization which is needed for sustainability of water projects. The findings also indicated that 29% of respondents which is the highest percentage agreed that CBWSOs' leaders have leadership skills in resource management that is important for sustainability of water project.

It was also revealed that 31% of respondents which is the highest percentage agreed that CBWSOs' leaders have technical skills and expertise needed for sustainability of water projects in contrary, the findings of this study indicated that 27% of respondents which is the highest percentage disagreed that CBWSOs' leaders have leadership skills in estimating project schedule and budget that is required for sustainability of water projects. Table 4.2 presents these findings in details.

Table 4.2: Respondents' Opinions on Management Skills of CBWSOs' Leaders

Statements	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	F	%	F	%	F	%	F	%	F	%
CBWSOs have leadership skills in community mobilization which is needed for sustainability of water projects	13	13	19	19	11	11	37	37	20	20
CBWSOs' leaders have leadership skills in resource management that is important for sustainability of water project	19	19	22	22	9	9	29	29	21	21
CBWSOs' leaders have technical skills and expertise needed for sustainability of water projects	10	10	23	23	12	12	31	31	24	24
CBWSOs' leaders have leadership skills in estimating project schedule and budget that is required for sustainability of water projects	25	25	27	27	11	11	22	22	15	15

Source: Research Data, (2023).

4.4.2 Respondents' Opinion on Water Tariffs Collected By CBWSOs and its Influence on Sustainability of Water Projects

The findings of this study indicated that 38% of respondents which is the highest percentage agreed that the water tariffs set is fair, any person in the village can afford. The findings also indicated that 32% of respondents which is the highest percentage agreed that money collected from water tariffs are used properly in maintenance of water infrastructures. It was also revealed that 39% of respondents which is the highest percentage agreed that water tariffs based on consumption if the good mode of payment. In contrary, it was revealed that 28 % of respondents which is the highest percentage disagreed that money collected from water tariffs are used properly for continuous improvement of the projects. in the same way, the findings of this study indicated that 26% of respondents which is the highest percentage disagreed that the CBWSOs in charge of collecting the water tariffs are transparent, all income and expenditures are announced to the community members. Table 4.3 presents these findings in details.

Table 4.3: Respondents' Opinion on Water Tariffs Collected By CBWSOs

Statements	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	F	%	F	%	F	%	F	%	F	%
The water tariffs set is fair, any person in the village can afford	6	6	16	16	7	7	38	38	33	33
Money collected from water tariffs are used properly for continuous improvement of the projects	27	27	28	28	10	10	21	21	14	14
Money collected from water tariffs are used properly in maintenance of water infrastructures	10	10	22	22	6	6	32	32	30	30
Water tariffs based on consumption if the good mode of payment	9	9	14	14	4	4	39	39	34	34
The CBWSOs in charge of collecting the water tariffs are transparent, all income and expenditures are announced to the community members	23	23	26	26	12	12	20	20	19	19

Source: Research Data, (2023).

4.4.3 Respondents' Opinions on Technical Assistance Provided by CBWSOs

The findings of this study indicated that 34% of respondents which is the highest percentage agreed that operators of CBWSOs have skills and expertise required for sustainability of water projects. It was also revealed that 37% of respondents which is the highest percentage agreed that CBWSOs assist in maintenance of infrastructure through their artisans. In the same way, 32% of respondents which is the highest percentage agreed that CBWSOs ensure that the spare parts are always available in order to attain sustainability of water projects. Furthermore, the findings of this study indicated that, 28% of respondents which is the highest percentage agreed that CBWSOs assist the community in the process of technology adoption. In contrast, the findings of this study also indicated that 29% of respondents which is the highest percentage disagreed that CBWSOs assist in the choice of pumping technology. Table 4.4 presents these findings in details

Table 4.4: Respondents' Opinions on Technical Assistance Provided by CBWSOs

Statements	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	F	%	F	%	F	%	F	%	F	%
Operators of CBWSOs have skills and expertise required for sustainability of water projects	8	8	18	18	9	9	34	34	31	31
CBWSOs assist in maintenance of infrastructure through their artisans	9	9	15	15	6	6	37	37	33	33
CBWSOs assist in the choice of pumping technology, which is important for water project sustainability	14	14	29	29	13	13	20	20	24	24
CBWSOs ensure that the spare parts are always available in order to attain sustainability of water projects	16	16	19	19	7	7	32	32	26	26
CBWSOs assist the community in the process of technology adoption.	9	9	25	25	11	11	28	28	27	27

Source: Research Data, (2023).

4.4.4 Respondents' Opinions on Sustainability of Water Projects

The findings of this study indicated that 31% of respondents which is the highest percentage agreed that there is a continuous improvement of water project. The findings also indicated that the highest percentage of respondents agreed that there are maintained benefits from the projects (30%) and the projects depend on reliable water sources (38%). In the same way, the findings of this study indicated that the highest percentage of respondents agreed that water projects ensure environmental protection and conservation (34%) and water projects help to empower locals/villagers in one way or another (31%). In contrary, the findings indicated that the highest percentage of respondents disagreed that the availability of water service in years around is of satisfiable (29%) and resources for water project are easily available (28%). Table 4.5 presents these findings in details

Table 4.5: Respondents' Opinions on Sustainability of Water Projects

Statements	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	F	%	F	%	F	%	F	%	F	%
The availability of water service in years around is of satisfiable	27	27	29	29	6	6	23	23	15	15
There is a continues improvement of water project	13	13	25	25	9	9	31	31	22	22
There is maintained benefits from the projects	12	12	24	24	11	11	30	30	23	23
The projects depend on reliable water sources	8	8	15	15	4	4	38	38	35	35
Resources for water project are easily available	26	26	28	28	12	12	23	23	11	11
Water Projects ensure Environmental protection and conservation	9	9	17	17	7	7	34	34	33	33
Water Projects help to empower locals/villagers in one way or another	10	10	23	23	8	8	31	31	28	28

Source: Research Data, (2023).

4.5 Implication of the Findings through Descriptive Statistics

The findings through descriptive statistics imply that CBWSOs have leadership skills in different matters including community mobilization, resource management and technical skills and expertise needed for sustainability of water projects. However, it was found that CBWSOs' leaders have no skills in estimating project schedule and budget that is required for sustainability of water projects. these findings concur with the findings of Aashiq et al (2020), found that the sustainability of rural water supply schemes depends on strong community leadership and administration. This includes financial and technical support, trainings, and administrative assistance.

Additionally, the findings through descriptive statistics implied that the water tariffs set is fair, any person in the village can afford, money collected from water tariffs are used properly in maintenance of water infrastructures and water tariffs based on consumption if the good mode of payment. In contrary, the findings through descriptive statistics implied that money collected from water tariffs are not used properly for continuous improvement of the projects and CBWSOs in charge of collecting the water tariffs are transparent, all income and expenditures are announced to the community members.

These findings are consistent with the findings of Cronk and Bartram, (2017) who found a strong, significant correlation between water tariff and water supply sustainability. The study recommended that money collected from the community through water tariffs should be transparent and used for continuous improvement of the projects. Furthermore, findings obtained through descriptive analysis implied that

operators of CBWSOs have skills and expertise required for sustainability of water projects, CBWSOs assists in maintenance of infrastructure through their artisans, CBWSOs ensures that the spare parts are always available in order to attain sustainability of water projects and CBWSOs assist the community in the process of technology adoption. In contrary, CBWSOs did not play role in the choice of pumping technology as they were not well involved. These findings are in line with the findings of Chumbula and Massawe, (2018) that technical aspects such as maintenance of project infrastructures, availability of spare parts and technical expertise of operators are very important factors towards achieving sustainability of water projects.

4.6 Inferential Statistics

This section present data obtained after running linear regression analysis, which gave us outputs including correlation statistics, model summary, ANOVA and multiple regression results. For multiple regression analysis to be valid, the study run multiple regression assumption test including test of auto-correlation assumption, test of normality assumption and test for multicollinerity assumption.

4.6.1 Multiple Regression Assumptions

4.6.1.1 Test of Auto-Correlation Assumption

Durbin-Watson (d) statistic value is supposed to be not less than 1 or greater than 3 and fully not exactly 2 (Field, 2009). Table 4.1 presents that the Durbin-Watson value is 1.541, which ranges between the values of $1.5 < d < 2.5$, suggesting that there was no auto-correlation errors in the regression model, and so no highly correlated variables in the general model.

Table 4.6: Model Summary

Model	Durbin-Watson
1	1.541

a. Predictors: (Constant), technical assistance, Management skills, water tariffs

b. Dependent Variable: sustainability of water projects

4.6.1.2 Test of Normality Assumption

This regression assumption must be tested because, in order to make a valid inference from a regression model, the regression residual must follow the normal distribution. Skewness and Kurtosis tests were done to ascertain the normality statistics. Field (2009) indicated that the values of skewness and kurtosis lying in between -2 and +2 the data is considered normally distributed and hence satisfactory for interpretation. The test results in Table 4.7 show that the residuals are normal, and the researcher was able to make a valid inference using this regression model.

Table 4.7: Descriptive Statistics

	N	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Management skills	100	.85504	.009	.241	.214	.478
Water tariffs	100	.88698	-.240	.241	-.719	.478
technical assistance	100	.75685	-.294	.241	-.710	.478
Sustainability of water projects	100	.66234	-.271	.241	.138	.478
Valid N (listwise)	100					

4.6.1.3 Test for Multi-Collinearity Assumption

This is measured to see if the predictor variables are highly correlated with one another. The VIF value above 10 and tolerance less than 0.1 means that there is significant multi-collinearity. The model does not suffer from multi-collinearity

because the VIF ranges from 1.259 to 1.403. For further inspection see Table 4.8. Additionally, the correlation results have confirmed that the independent variables does not correlate to one another, implying that the model does not suffer from multi-collinearity.

Table 4.8: Assumption for multicollinearity

Model	Collinearity Statistics	
	Tolerance	VIF
(Constant)		
1		
Management skills	.794	1.259
Water tariffs	.766	1.306
technical assistance	.713	1.403

a. Dependent Variable: sustainability of water projects

4.6.2 Correlation Analysis

This part presents the correlation analysis results of the study's independent variables including management skills, water tariffs and technical assistance and sustainability of water projects as the model's dependent variable. According to Wileman & Jary (1997, correlation coefficient (r_s) ranging from 0.00 to 0.1 is considered very weak, from 0.20 to 0.39 is weak, from 0.4 to 0.59 is considered moderate, 0.6 to 0.79 is strong and lastly 0.8 to 1.0 is very strong.

The model's correlation results indicated that correlation coefficients for management skills and sustainability of water projects was 0.709 and the p-value was 0.000. It was also revealed that correlation coefficients for water tariffs and sustainability of water projects was 0.627 and the p-value was 0.000. Moreover, correlation results indicated that correlation coefficients for technical assistance and sustainability of water projects was 0.447 while the p-value was 0.000. These

findings imply that management skills and water tariffs have strong and significant correlation with sustainability of water projects while technical assistance have moderate and significant correlation with sustainability of water projects.

Table 4.9: Correlation Analysis Results

		1	2	3	4
1. Sustainability of water projects	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	100			
2. Management skills	Pearson Correlation	0.709	1		
	Sig. (2-tailed)	0.000			
	N	100	100		
3. Water tariffs	Pearson Correlation	0.627	0.342	1	
	Sig. (2-tailed)	0.000	0.000		
	N	100	100	100	
4. Technical assistance	Pearson Correlation	0.447	0.421	0.455	1
	Sig. (2-tailed)	0.000	0.000	0.000	
	N	100	100	100	100

Source: Research Data, (2023)

4.6.3 Model Summary

This part provides the R values. The R value explains how well the whole model describes the data. In this case the model explained 81.9% of the data. R square explains the extent to which the variability of the dependent variable is explained by the independent variables. In this case 67.1% of the variability in sustainability of water projects was explained by the independent variables namely management skills, water tariffs and technical assistance. In this study, the adjusted R square value was 66.1%. This means that accurately, 66.1% of the total variability of the dependent variable was explained by the independent variables.

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	.819 ^a	.671	.661	.38551	.671	65.408	3	96	.000

a. Predictors: (Constant), technical assistance, Management skills, water tariffs

4.6.4 ANOVA

This section presents ANOVA results after running linear regression analysis of the independent variables including management skills, water tariffs and technical assistance and the dependent variable which is sustainability of water projects. The ANOVA results indicated that model's significant value which is also regarded as p-value was 0.000 which is less than 0.05, which inform us that the model's independent variables reliably explain sustainability of water projects which is the model's dependent variable.

Table 4.11: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29.163	3	9.721	65.408	.000 ^b
	Residual	14.267	96	.149		
	Total	43.430	99			

a. Dependent Variable: sustainability of water projects

b. Predictors: (Constant), technical assistance, Management skills, water tariffs

4.6.5 Multiple Regression Analysis

Multiple regression analysis is used to analyze the relationship between a single dependent variable and several predictor variables (Kothari, 2014). According to Pallant (2005), when evaluating each of the independent variables if the **Sig.** value (p-value) is less than .05, then the variable is making a significant unique contribution to the prediction of the dependent variable. If greater than .05, then you

can conclude that variable is not making significant unique contribution to the prediction of your dependent variables. In addition, if Beta coefficient is positive, it means that predictor variable has positive influence on dependent variable and vice-versa. The following is the table for multiple regression analysis.

Table 4.12: Multiple Regression Analysis

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
1	(Constant)	1.177	.198	5.949	.000
	Management skills	.430	.051	.555	.000
	Water tariffs	.321	.050	.430	.000
	Technical assistance	.015	.061	.017	.805

a. Dependent Variable: sustainability of water projects

From Table 4.12, multiple regression results in respect to Beta and Sig. values indicated that the model's predictor variables including management skills and water tariffs have positive and significant influence on sustainability of water projects which is the model's outcome variable. This is slight inconsistent with the influence that technical assistance has on sustainability of water projects, as multiple regression analysis results indicated that technical assistance has positive influence on sustainability of water projects but its influence is not significant as p-value is above 0.05. In details, these findings imply that management skills influence sustainability of water projects by 55.5%, water tariffs influence sustainability of water projects by 43.0%, while technical assistance influence sustainability of water project by 1.7%.

CHAPTER FIVE

DISCUSSIONS OF RESEARCH FINDINGS

5.1 Overview

This part presents the discussions of the findings of this study which were obtained through descriptive statistics as well as multiple regression analysis. This section is organized according to the objectives of this study. The findings of this study are discussed in this section with the aid of other studies related to this topic.

5.2 The Impact of Management Skills on Sustainability of Water Projects

Management skills contribute highly to sustainability of water projects. This has been confirmed by this study as well as other studies which have been conducted before. The findings through multiple regression analysis indicated that management skills have positive and significant influence on sustainability of water projects in Tanzania. Furthermore, descriptive statistics' findings indicated that CBWSOs have leadership skills in different matters including community mobilization, resource management and technical skills and expertise needed for sustainability of water projects. However, it was found that CBWSOs' leaders have no skills in estimating project schedule and budget that is required for sustainability of water projects.

The findings of this study concurs with the findings from other studies including Daniel et al (2022), Aashiq et al, (2020) and Nyamutera and Warue, (2021). Daniel et al, (2022) in their study showed a positive correlation between effective management and the efficiency of rural water supply and sanitation programs. Aashiq et al (2020), found that the sustainability of rural water supply schemes depends on strong community leadership and administration. This includes financial

and technical support, trainings, and administrative assistance. Additionally, Nyamutera and Warue, (2021) found organizational leadership is crucial in promoting decision-making, creating policies, and spreading best practices for project management throughout the company.

5.3 The Effect of Water Tariffs on Sustainability of Water Projects

It has been postulated by different empirical studies including this that water tariffs is one amongst important variables on attainment of sustainability of water projects. The findings of this study obtained after multiple regression analysis indicated that water tariffs have positive and significant influence on sustainability of water projects in Tanzania. Moreover, the findings through descriptive statistics implied that the water tariffs set is fair, any person in the village can afford, money collected from water tariffs are used properly in maintenance of water infrastructures and water tariffs based on consumption is the good mode of payment. In contrary, the findings through descriptive statistics implied that money collected from water tariffs are not used properly for continuous improvement of the projects and CBWSOs in charge of collecting the water tariffs are transparent, all income and expenditures are announced to the community members.

The findings of this study are consistent with the findings of Olela, (2018) that water tariffs have positive associations with sustainability of water projects. Similarly, Cronk and Bartram, (2017) found that fee collection is associated with higher functionality of water schemes in Nigeria. The study added that monthly collection of fees is associated with higher functionality than collection of fees when the system breakdown occur. Additionally, the findings on the study conducted by Abanyie et al

(2023) showed a strong, significant correlation between water tariff and water supply sustainability. The study recommended that money collected from the community through water tariffs should be transparent and used for continuous improvement of the projects.

5.4 The Effect of Technical Assistance on Sustainability of Water Projects

This study also intended to examine the effect of technical assistance on sustainability of water projects. The findings through multiple regression analysis confirmed that technical assistance plays a critical role on achieving sustainability of water projects. It was revealed that technical assistance have positive influence on sustainability of water projects. Additionally, the findings obtained through descriptive analysis implied that operators of CBWSOs have skills and expertise required for sustainability of water projects, CBWSOs assists in maintenance of infrastructure through their artisans, CBWSOs ensures that the spare parts are always available in order to attain sustainability of water projects and CBWSOs assist the community in the process of technology adoption. In contrary, CBWSOs did not play role in the choice of pumping technology as they were not well involved.

The findings of this study were in line with the findings of Chumbula and Massawe, (2018) that technical aspects such as maintenance of project infrastructures, availability of spare parts and technical expertise of operators are very important factors towards achieving sustainability of water projects. Also, Masombe and Omwenga (2020) found that very little technology was used in the management of water initiatives, which hurt their ability to last. Similarly, Kativhu et al (2021) indicated that the likelihood of experiencing a breakdown dropped as the frequency

of preventive maintenance rose. Additionally, Richard, (2022) found that strategic technology adoption practice has a big impact on the longevity of community water supply initiatives in marginalized Kenya.

CHAPTER SIX

SUMMARY OF THE FINDINGS, CONCLUSION AND RECOMMENDATIONS

6.1 Overview

This section describes the summary of the findings and conclusion in respect to the findings obtained through descriptive statistics and multiple regression analysis. This section also describes the recommendations reached based on the findings in each study objective.

6.2 Summary of the Findings

This study intended to assess the impact of management skills on sustainability of water projects. The findings through multiple regression analysis indicated that management skills have positive and significant influence on sustainability of water projects in Tanzania. In particular, according to Beta coefficients, management skills influences sustainability of water projects by 55.5%. Furthermore, the findings of this study indicated that the highest percentage of respondents (37%) agreed that CBWSOs have leadership skills in community mobilization, CBWSOs' leaders have leadership skills in resource management (29%) and CBWSOs' leaders have technical skills and expertise needed for sustainability of water projects (31%). In contrary, the highest percentage of respondents (27%) disagreed that CBWSOs' leaders have leadership skills in estimating project schedule and budget that is required for sustainability of water projects.

This study also aimed to examine the effect of water tariffs on sustainability of water projects. The findings through multiple regression analysis indicated that water

tariffs have positive and significant influence on sustainability of water projects in Tanzania. According to Beta coefficients, it was revealed that water tariffs influence sustainability of water projects by 43.0%. Furthermore, the findings of this study indicated that highest percentage of respondents (38%) agreed that the water tariffs set is fair, any person in the village can afford, money collected from water tariffs are used properly in maintenance of water infrastructures (32%) and water tariffs based on consumption is the good mode of payment (39%).

In contrary, it was revealed that highest percentage of respondents (28 %) disagreed that money collected from water tariffs are used properly for continuous improvement of the projects and that CBWSOs in charge of collecting the water tariffs are transparent, all income and expenditures are announced to the community members (26%). This study also intended to examine the effect of technical assistance on sustainability of water projects. Multiple regression analysis results indicated that technical assistance have positive influence on sustainability of water projects but the relationship is not significant as the p-value was above the required level of 0.05.

Additionally, the findings through descriptive statistics indicated that highest percentage of respondents (34%) agreed that operators of CBWSOs have skills and expertise required for sustainability of water projects, CBWSOs assists in maintenance of infrastructure through their artisans (37%) and the spare parts are always available in order to attain sustainability of water projects (37%). Furthermore, the findings of this study indicated that, 28% of respondents which is the highest percentage agreed that CBWSOs assist the community in the process of

technology adoption. In contrary, the findings of this study also indicated that 29% of respondents which is the highest percentage disagreed that CBWSOs assist in the choice of pumping technology.

6.3 Conclusion

This study reached to the conclusion that management skills, water tariffs and technical assistance are the important factors with positive influence on sustainability of water projects in Tanzania. This conclusion imply that CBWSOs which are in charge of managing water projects in the district have appropriate management skills, they supervise well the collection of water tariffs and provide technical assistance, which is important for sustainability of water projects. However, there are some weaknesses which have been noticed from the management of water projects by CBWSOs.

One of the weaknesses is that CBWSOs' leaders lack leadership skills in estimating project schedule and budget. Other shortcomings are such as; money collected from water tariffs are not used properly for continuous improvement of the projects, CBWSOs in charge of collecting the water tariffs are not transparent, all income and expenditures are not openly announced to the community members and CBWSOs had no assistance in the choice of pumping technology. From this situation, this study concludes that CBWSOs are the important agencies for supervising and managing water projects, although they highly need support from the government and full involvement on matters concerning water projects from the design stage.

6.4 Recommendations

This study proposes the following recommendations as per the study results:

- i. This study strongly recommends that RUWASA should conduct managerial training to leaders of CBWSOs which supervise and manage the water projects entrusted to them by the government. This is because although the leaders do their best in managing the water projects in Tanzania, they lack management skills in important matters like estimating project schedule and budget that is required for sustainability of water projects.
- ii. The study also recommends that CBWSOs should ensure transparency on the income collected through water tariffs and expenditures incurred in a way of project implementation. This includes transparent announcement of all income and expenditures to the community members who are actually the owners and beneficiaries of water projects implemented in Tanzania. This recommendation is very important to be adhered because the findings of this study indicated that there are weaknesses on the transparency of CBWSOs on the income and expenditures of the project.
- iii. This study recommends that all water tariffs collected from the community by CBWSOs are used properly for continuous improvement of the projects. This is vast important for increasing the life span of the water infrastructures and development of new water projects to other areas which have not yet being reached. The findings of this study indicated that the community have doubts on whether all the money collected through water tariffs are used properly for continuous improvement of the project, hence what has been recommended should be strongly considered by CBWSOs and other authorities including RUWASA and the ministry in charge.
- iv. The study suggests that the project donors, the ministry in charge of water and

sanitation, RUWASA and all parties involved in the process of choice of pumping technology to consider involving all stakeholders including the community and the CBWSOs which are in charge of project supervision and management. This is because the community and CBWSOs also have valuable inputs about the choice of pumping technology because they are on the field. Hence, the authorities should address the lack of stakeholder's involvement in the choice of pumping technology that has been reported by this study.

- v. The study suggests that, the CBWSOs can use microfinance services that are savings and loan products of which in the long run those services will enable them to buy more equipment like pumps, motors, connectors and other tools but also to extend new water system to increase accessibility of water in the community. Hence this will lead to sustainability of water projects.

6.5 Area for Further Study

This study opens avenue for further study in order to add more knowledge about the factors which influence sustainability of water projects. This study was limited to three predictor variables including management skills, water tariffs and technical assistance. In order to add more knowledge, the future researchers can give priority to other predictor variables such as stakeholder participation, cultural factors and geographical factors.

6.6 Limitation and Delimitation of the Study

The study considers certain limitations in advance before data collection process. At the time of data collection it will be very cold that the researcher may be forced to work during afternoon hours that the weather will be convenient. This will reduce

the amount of working hours per day; hence the researcher will wear clothes more convenient in cold weather condition. Time is also a limitation but the researcher will work hard and extend working hours and employ research assistants in data collection process in order to meet the allocated time for the study. Furthermore, the utilization of questionnaire as data collection instrument pose some few constraints on respondent's comprehension of the questions. After noting this limitation, piloting of the questionnaire to 10% of respondents will be done before the full scale deployment of the questionnaires to be done.

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APPENDICES

APPENDIX I: QUESTIONNAIRE

1. CHARACTERISTICS OF RESPONDENTS

No	Questions/Variable	Response	Code
a)	Gender	Male	1
		Female	2
b)	Age		
c)	Education level	No formal education	1
		Primary education	2
		Secondary education	3
		University Education	4
d)	Occupation	Livestock keeper	1
		Farmer	2
		Employed	3
		Entrepreneur	4
		Others.....	5
e)	Income level per month	0-100,000	1
		100,001-300,000	2
		300,001-500,000	3
		More than 500,000	4

2. MANAGEMENT SKILLS

Kindly indicate the extent to which you agree with the following statements concerning management skills of CBWSOs. Use the scale of (1-Strongly disagree 2-Disagree 3-Neutral 4-Agree 5-Strongly agree).

	STATEMENT	1	2	3	4	5
a)	Leadership skills in community mobilization have an influence on sustainability of water projects					
b)	Leadership skills in resource management leads to					
c)	Technical skills and expertise of leaders have an influence on sustainability of water projects					
d)	Leadership skills in estimating project schedule and budget leads to sustainability of water projects					

3. WATER TARIFFS

Kindly indicate the extent to which you agree with the following statements concerning water tariffs collected from the community by CBWSOs. Use the scale of (1-Strongly disagree 2-Disagree 3-Neutral 4-Agree 5-Strongly agree)

	STATEMENT	1	2	3	4	5
a)	The water tariffs set is fair, any person in the village can afford					
b)	Money collected from water tariffs are used properly for continuous improvement of the projects					
c)	Money collected from water tariffs are used properly in maintenance of water infrastructures					
d)	Water tariffs based on consumption if the good mode of payment					
e)	The CBWSOs in charge of collecting the water tariffs are transparent, all income and expenditures are announced to the community members					

4. TECHNICAL ASSISTANCE

Kindly indicate the extent to which you agree with the following statements concerning technical assistance provided by CBWSOs. Use the scale of (1-Strongly disagree 2-Disagree 3-Neutral 4-Agree 5-Strongly agree)

	STATEMENT	1	2	3	4	5
a)	Operators' skills and expertise leads to sustainability of water projects					
b)	Maintenance of infrastructure leads to sustainability of water projects					
c)	Good choice of pumping technology leads to sustainability of water projects					
d)	Availability of spare parts have an influence on sustainability of water projects					
e)	Adoption of technology by the community leads to sustainability of water projects					

5. SUSTAINABILITY OF WATER PROJECT

Kindly indicate the extent to which you agree with the following statements concerning sustainability of water project in your village. Use the scale of (1-Strongly disagree 2-Disagree 3-Neutral 4-Agree 5-Strongly agree)

	STATEMENT	1	2	3	4	5
a)	The availability of water service in years around is of satisfiable					
b)	There is a continues improvement of water project					
c)	There is maintained benefits from the projects					
d)	The projects depend on reliable water sources					
e)	Resources for water project are easily available					
f)	Water Projects ensure Environmental protection and conservation					
g)	Water Projects help to empower locals/villagers in one way or another					

Appendix III: Budget

ITEM	COST	UNIT	TOTAL
Accommodation			
Lodge/Guest house	20,000.00	30 days	600,000.00
Personal			
Food	10,000.00	60 days	600,000.00
Drinking water	3000.00	60 days	180,000.00
Communication(Cell phone)	2,000.00	60 days	120,000.00
Emergency	10,000.00	60 days	600,000.00
Transport			
To and From the study area	15,000.00	60 days	900,000.00
To and from the university	45,000.00	20 days	900,000.00
Stationeries & Secretarial services			
Stapler machine	10,000.00	1 pc	10,000.00
Stapler pins	5,000.00	1 Packet	5,000.00
Punching machine	20,000.00	1 pc	20,000.00
Duplicating papers	20,000.00	2 reams	40,000.00
Cartilages ink	200,000.00	1pc	200,000.00
Photocopies and binding	250,000.00	In General	250,000.00
External storage disc and Diskette	50,000.00	2	100,000.00
Presentation and report submission	1,000,000.00	In General	1,000,000.00
Research Assistant Allowance	25,000.00	1person x 30days	750,000.00
GRAND TOTAL			6,275,000.00

Appendix IV: Research Clearance Letter



Ref. No OUT / PG202001137

4th August, 2023

Manager,
Rural Water Supply and Sanitation Agency (RUWASA),
P.O. Box 89,
TANGA.

Dear Manager,

RE: RESEARCH CLEARANCE FOR MS. JUDITH NKYA. REG NO: PG202001137

2. The Open University of Tanzania was established by an Act of Parliament No. 17 of 1992, which became operational on the 1st March 1993 by public notice No.55 in the official Gazette. The Act was however replaced by the Open University of Tanzania Charter of 2005, which became operational on 1st January 2007. In line with the Charter, the Open University of Tanzania mission is to generate and apply knowledge through research.

3. To facilitate and to simplify research process therefore, the act empowers the Vice Chancellor of the Open University of Tanzania to issue research clearance, on behalf of the Government of Tanzania and Tanzania Commission for Science and Technology, to both its staff and students who are doing research in Tanzania. With this brief background, the purpose of this letter is to introduce to you **Ms. Judith Nkya, Reg. No: PG202001137**, pursuing **Masters of Project Management (MPM)**. We here by grant

this clearance to conduct a research titled **"The Contribution of Community based Water and Sanitation Organizations towards Achieving Sustainability of Water Projects: A Case of Pangani District"**. She will collect her data at your office from 7th August to 7th September 2023.

4. In case you need any further information, kindly do not hesitate to contact the Deputy Vice Chancellor (Academic) of the Open University of Tanzania, P.O.Box 23409, Dar es Salaam. Tel: 022-2-2668820. We lastly thank you in advance for your assumed cooperation and facilitation of this research academic activity.

Yours sincerely,

THE OPEN UNIVERSITY OF TANZANIA

Prof. Magreth S. Bushesha

For: **VICE CHANCELLOR**