PERFORMANCE ANALYSIS OF ZOMBA WATER USERS' ASSOCIATION IN RURAL WATER SUPPLY SCHEMES: A FOCUS ON FINANCIAL, OPERATIONAL, AND CUSTOMER PERSPECTIVES

MSc THESIS (WATER RESOURCES MANAGEMENT AND DEVELOPMENT)

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MZUZU UNIVERSITY

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BSc (Natural Resources Management), Certificate (MSCE)

A THESIS SUBMITTED TO THE FACULTY OF ENVIRONMENTAL SCIENCES, DEPARTMENT OF WATER AND SANITATION IN FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE DEGREE (MSc) IN WATER RESOURCES MANAGEMENT AND DEVELOPMENT

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DECLARATION

I, **Temwa Chilanga**, hereby declare that this thesis titled, "**Performance analysis of Zomba water users' associations in rural water supply schemes: A focus on financial, operational, and customer perspectives"** has been written by me and is a record of my research work. All citations, references, and borrowed ideas have been duly acknowledged. It is being submitted in fulfilment of the requirements for the award of the degree of Water Resources Management and Development of the Mzuzu University. None of the present work has been submitted previously for any degree or examination in any other university.

Signature_____ Date _____

CERTIFICATE OF COMPLETION

I, the undersigned, certify that this thesis is a result of the author's work and that to the best of my knowledge, it has not been submitted for any other academic qualification within the Mzuzu University or elsewhere. The thesis is acceptable in form and content, and that satisfactory knowledge of the field covered herein was demonstrated by the candidate through an oral examination held on ……

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ABSTRACT

Water utilities in developing countries are locked in a vicious cycle, with weak operational and financial capacity, leading to performance failures and inefficiencies. Water Users Associations (WUAs) have been adopted in Malawi to govern rural water supply systems. This study aimed to evaluate the performance of WUAs in Zomba and devise strategies for sustained improvements in water delivery services. Specific objectives were to: assess the performance of WUAs in financial, customer, and operational performance indicators and examine factors influencing the WUAs. The study adopted a mixed-method research design. Seven WUAs were targeted in Zomba of which one was dissolved. Questionnaires, key informant interviews, and focus group discussions were used to collect data on performance measures of the utilities, customer perceptions, and factors influencing performance. SPSS and Microsoft Excel software and thematic analysis were used in data analysis. Results displayed poor financial performance as only one WUA hit a working ratio of 1.1 while the rest operated on negative accounts. The majority further faced challenges in revenue collection. Compromised water quality due to lack of chlorination was displayed in two-thirds of the WUAs and customers complained of turbid water during the rainy season in all WUAs due to lack of filters. On tariffs, 73% of customers found the pricing reasonable whilst on the overall customer satisfaction, 95% of customers were satisfied. It was found that all WUAs, except one, were unable to quantify their water losses and none had hit the target of the staff-efficiency measure. The study concluded that the WUAs were mostly affected by a lack of supportive policies, poor governance, a low revenue base, and aging infrastructure. Therefore, it is recommended that the WUAs deserve post-construction support from the government and other key players to enhance the sustainability of rural water supply schemes in Malawi.

Keywords*: Customers, Financial, Operational, Performance, Water Users Associations (WUAs)*

DEDICATION

I dedicate this work to God the Almighty who granted me the grace to reach this far, and to my family who have tirelessly supported me and enhanced my capacity to complete this work. Thank you for the financial, physical, spiritual, psychological support and love shown to me. May God richly bless you all!

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ABBREVIATIONS AND ACRONYMS

CBM	Community Based Management
CBNRM	Community Based Natural Resources Management
GMI	Group Maturity Index
GoM	Government of Malawi
IBNET	International Benchmarking Network for Water and Sanitation Utilities
IWA	International Water Association
JICA	Japan International Cooperation Agency
MoIWD	Ministry of Irrigation and Water Development
MZUNIREC	Mzuzu University Research Ethics Committee
NRW	Non-Revenue Water
O&M	Operation and Maintenance
PM	Performance Management
SDG	Sustainable Development Goal
SRWB	Southern Region Water Board
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
WTP	Willingness to Pay
WUA	Water Users Association

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CHAPTER 1: INTRODUCTION

1.1 Background

The United Nations Millennium Development Goals spearheaded efforts to increase access to safe drinking water since the year 2000 (United Nations 2012). There were however shortcomings in these development goals including their limited scope in implementation, inequitable progress, sustainability issues, and their lack of integrating water and sanitation as an interconnected goal. Representatives from the world community subsequently agreed and signed the 2030 Sustainable Development Agenda in September 2015 (Agenda 2030) following the establishment of the Sustainable Development Goal (SDG) 6 (WHO and UNDP 2018). This was a renewed commitment towards addressing the broad spectrum of water and sanitation issues sustainably. SDG 6 commits to a global effort to provide universal access to equitable, safe, and affordable drinking water and sanitation by 2030. It therefore makes sure all people have fair and just access to water, that there are reasonable costs associated with access to essential water and sanitation services, and that they meet quality and safety standards.

The Government of Malawi (GoM) has, therefore, been implementing piped water supply and sanitation services in market centers and rural areas with support from bilateral and multilateral cooperating partners such as the World Bank, the African Development Bank, the European Union, Japan International Cooperation Agency (JICA), United Nations Children's Fund (UNICEF), and Water Aid Malawi (WUA Guidelines 2010). The incorporation of local governments and communities in the planning, development, and management of water supplies and sanitation services helps in the sustainability of such projects (National Water Policy 2005). The GoM, through the Ministry of Water and Sanitation, emphasises on Community Based Management (CBM) approach as a mechanism for sustainable operations and maintenance (O&M)

of the facilities. Malawi, among a few developing countries, recently turned from the largely failed top-down to community-based water governance for peri-urban water supply through Water Users Associations (WUAs) (Adams and Zulu 2015).

Before WUAs, communal water kiosks were the main source of water for peri-urban areas which later were characterised by poor management, vandalism, poor responsiveness to faults, and community complaints (Rusca 2014). Consequently, the WUA concept was adopted as a better option in the decentralization of the water service sector to ensure sustainable management of water and sanitation systems.

The WUA model was initially applied in the irrigation sector in the 1970s as an alternative to state-run irrigation systems which were perceived as underperforming (Rap 2006 and Meinzen-Dick 2007). The importance of financial sustainability and capacity building for WUAs in managing irrigation schemes effectively is highlighted. The findings of a study conducted at Wovwe Irrigation Scheme in Karonga demonstrated the success of WUAs in managing irrigation systems, as evidenced by their ability to effectively raise funds for O&M activities, provide training to members, and achieve sustainable water resource management practices (Gondwe 2018). More recently, possibly because of the 'optimism' with which WUAs have been presented in the irrigation sector, this model has become more popular in water supply projects in low-income areas or informal settlements (Rusca 2014). In Malawi, it was first established in 2007 in the context of a water supply project implemented by WaterAid, an international Non-Governmental Organization, in peri-urban Lilongwe. It has since been upscaled to other peri-urban, market centers and rural areas.

Although there have been favourable advancements attributed to the WUA model in areas of its implementation, there are still water supply and service delivery challenges faced, including

WUAs in Zomba WUAs, such as water infrastructure failures, excessive demand, and irregular water supply, which are brought in by many other factors (Adams and Zulu 2015). The performance of such water users' committees in Uganda is deemed to be poor due to issues of low participation by members, which also means insufficient funds, therefore, reducing the quality of service delivery (Terry 2014). A study by Braimah (2016) and Mangum (2017) in Ghana and Amazonas, respectively, report challenges of inadequate water coverage due to broken down facilities of such locally managed facilities and the challenges that come with community-based management approaches in rural water supply systems. Monitoring and evaluation of the WUAs performance over time is, therefore, required to ensure that objectives are being achieved and that challenges faced are addressed for continuous service delivery.

Improved performance is fundamental, and a well-performing utility is that which can provide high-quality water and/or wastewater services to its customers in a sustainable manner (Van den Berg and Danilenko 2017). According to Van den Berg and Danilenko (2017), this definition of a well-performing utility includes elements of good financial, operational, and customer performance, but also universal access to water/wastewater services that are affordable to all. Thus, performance analysis can be conducted from financial, operational, and customer perspectives to check if water utilities are well-performing. Additionally, differences in performances may be exhibited in different firms due to differences in scales of operations, managerial skills, degree of competition faced, institutional factors, discriminatory government policies, and ownership (Renzetti and Dupont 2003). Performance assessment encompasses the evaluation of efficiency (doing the things right) and effectiveness (doing the right things) of activities and processes (De Witte and Marques 2012). It can therefore be used as a tool to manage water utilities and achieve sustainability. Sustainable water supply schemes in Malawi ensures that users have access to

reliable, safe, and sustainable water (WaterAid 2016). According to a case study done in Lilongwe and Blantyre, sustainable WUAs were able to pay bills, salaries, had good corporate governance, administration, human resources practices, hygiene kiosks, and community social responsibility.

With this background information, it is useful to assess the performance of WUAs in the Zomba district in terms of their service delivery and find useful information that can aid in ensuring the sustainability of the associations.

1.2 Problem Statement

Water utilities in developing countries often face persistent challenges characterised by inadequate operational and financial capacities, leading to suboptimal performance and inefficiencies (Sattarov and Volkova 2020). These utilities exhibit deficiencies across operational, financial, and customer performance metrics, as well as in institutional arrangements (Van den Berg and Danilenko 2017). The resulting deterioration in service quality is often attributed to ineffective management and financial fragility, which significantly fall short of best practices (Water and Sanitation Program 2006).

In Malawi, the Sector Performance Report (2012) highlights the struggles of WUAs in providing sustainable piped water services, citing issues, such as reduced numbers of functional taps due to low yields and aging infrastructure. The report recommends strengthening WUA capacity through the development of federations to facilitate knowledge-sharing. Similar recommendations for capacity building are echoed in the Malawi Appraisal Report (2014).

Studies, such as Ncube's (2012) investigation in Bulawayo, identify multiple factors impacting water supply systems' performance, including seasonal water shortages, affordability constraints, and adverse economic conditions. These studies emphasize adopting a consumer-centric approach,

providing incentives for utility managers, and establishing regulatory bodies to monitor performance and protect consumer interests.

Despite the viability and potential benefits of community-managed rural water supply systems, sustainability challenges persist, as evidenced by findings in Amazonas (Mangum, 2017). These challenges include a lack of training, inadequate financial capacity, and governance issues (Ministry of Water and Sanitation, 2023). In Zomba District, poor performance and failure of cost recovery incapacitate the operation and maintenance of water supply schemes, sometimes leading to the dissolution of WUAs and necessitating alternative management arrangements.

This study was conceived to provide insights into the extent of the challenges in Zomba District, through a comprehensive analysis of the WUAs and to ensure that the valuable insights, help in devising effective strategies, and drive sustainable improvements in water delivery services.

1.3 Study Objectives

1.3.1 Main Objectives

To assess the financial, operational, and customer performance of Zomba Water Users Associations in rural water supply schemes.

1.3.2 Specific Objectives

i) To assess the financial performance of the Water Users Associations.
ii) To analyse the customer service and user perceptions towards the performance of Water Users Associations.
iii) To evaluate the operational performance of the Water Users Associations.
iv) To examine factors influencing the performance of WUAs

1.3.3 Research questions

i) What is the financial performance of the Water Users Associations in the study area?

ii) What is the customer performance and user perceptions towards performance in the Water Users Associations?

iii) What is the operational performance of the Water Users Associations?

iv) What issues influence the performances of the Water Users Associations?

1.4 Justification of the study

Better understanding is the first step towards enhanced performance. It was, therefore, significant to carry out this research to help generate useful information regarding the performance status of the existing Zomba Water Users Associations and the causes of the WUAs' failure to sustain their water supply system. The research findings will be of importance to the WUA staff and board members as they will aid in identifying improvement areas so that the WUAs continually and sustainably offer services to their consumers. The findings of this research will also consequently ease regulation and monitoring for WUA managers and district staff in supporting the WUAs towards performance improvement as well as prevent further dissolutions.

1.5 Ethical clearance

The ethical clearance to collect data was sought from the Mzuzu University Research Ethics Committee (Appendix 1). It was put into consideration that the aim and purpose of this study were revealed to the participants. Consent to conduct research in respective water supply schemes was sought from the scheme gatekeepers (appendix 2). Throughout the research process, openness and transparency to the subjects was key. Finally, caution and seeking consent are always exercised in handling and disseminating study findings.

1.6 Study limitation

A major constraint of this study was the lack of comprehensive data or records available from most of the WUAs, particularly concerning certain performance indicators. Due to incomplete or unavailable data, assessing certain aspects of WUA performance was challenging. Resultantly, some variables had to be assessed qualitatively rather than measured quantitatively. This limitation may have impacted the depth of analysis and completeness of findings in those areas.

CHAPTER 2: LITERATURE REVIEW

2.1 Chapter introduction

This review examines the performance of Water Users Associations (WUAs) in the management of rural water supply schemes in developing countries. The study is aimed at assessing the performance of WUAs, singling out suboptimal performances, and determining the factors that tend to play a role in influencing performance in rural water supplies.

2.2 Overview

Since transitioning from the United Nations Millennium Development Goals to the Sustainable Development Goals, there has been a renewed global commitment when it comes to SDG 6 which commits to a global effort to provide universal access to equitable, safe, and affordable drinking water and sanitation by 2030. There were now increasing efforts aiming at covering a broader scope of issues related to water and sanitation including sanitation, hygiene, water quality, water scarcity, water management, and the protection and restoration of water-related ecosystems. There is also a focus on taking an integrated approach, emphasizing sustainable approaches and highlighting inclusivity and equity (WHO and UNDP 2018). Stemming from the discussed commitments, the importance of participatory decision-making processes and the involvement of marginalized communities in water and sanitation management was recognized.

Henceforth, water-policy reforms from the government to community-centered approaches have gained momentum over the past two decades under decentralization and the popular Community Based Natural Resources Management (CBNRM) prescriptions (Ferguson et al. 2005). CBNRM not only offers an alternative to largely failed public and privatized water-supply approaches for the poor, but also a means for cash-starved and mismanaged public agencies to externalize water-supply

and system expansion costs to the users. It is also attractive for its underlying tenets, including community empowerment through user self-organizing into recognized local organizations, e.g., associations, committees, and cooperatives; formulating locally agreed operational rules on resource use and user behavior, including sanctions (often contained in constitutions), and a management plan for the resource mutually agreed by key stakeholders.

The Malawi Government, through the Ministry of Irrigation and Water Development (MoIWD), is focusing on options that advocate community participation and empowerment in its national water development programmes and projects. The GoM puts much emphasis on the Community Based Management (CBM) approach, whereby participating communities are empowered to plan, own, operate, maintain, and manage their own water supply and sanitation systems and facilities (WUA guidelines 2010). This approach will ensure that the SDG goals are met, thus, making sure that all people have fair and just access to water, that there are reasonable costs associated with access to essential water and sanitation services, and that they meet water quality and safety standards.

The concept of Water Users Associations (WUAs) has, therefore, been adopted to ensure sustainable management of water and sanitation systems. The main purpose of establishing WUAs was to ensure efficient, reliable, and sustainable water supply and sanitation services through improved management systems at the lowest appropriate level. Each WUA is guided by a constitution, which stipulates functions, composition, selection criteria, and financial management requirements and other relevant information.

In a market center and rural piped water supply and sanitation system, WUAs are responsible for the following:

- Facilitating and overseeing the water supply scheme and ensuring transparency and accountability.

- Guiding planning of water supply and sanitation systems including issues of catchment
- Protection and social safeguards.
- Contracting and supervising routine technical operations and maintenance of the scheme.
- Arranging for long-term technical assistance to improve efficiency and resolve problems.
- Expanding the system over time.

WUAs can be registered under the Trustees Incorporation Act (1998). The organizational structure of WUA consists of a Local Authority, a General Assembly, a WUA Board, a Local Utility Operator (LUO) as Secretariat, and water users as primary stakeholders as portrayed in Figure 1. WUAs collaborate with different stakeholders in the district such as Area & village development committees, District Coordinating Team, Area Executive Committees, Extension Workers Team, MoIWD, Water Boards, and other Service Providers.

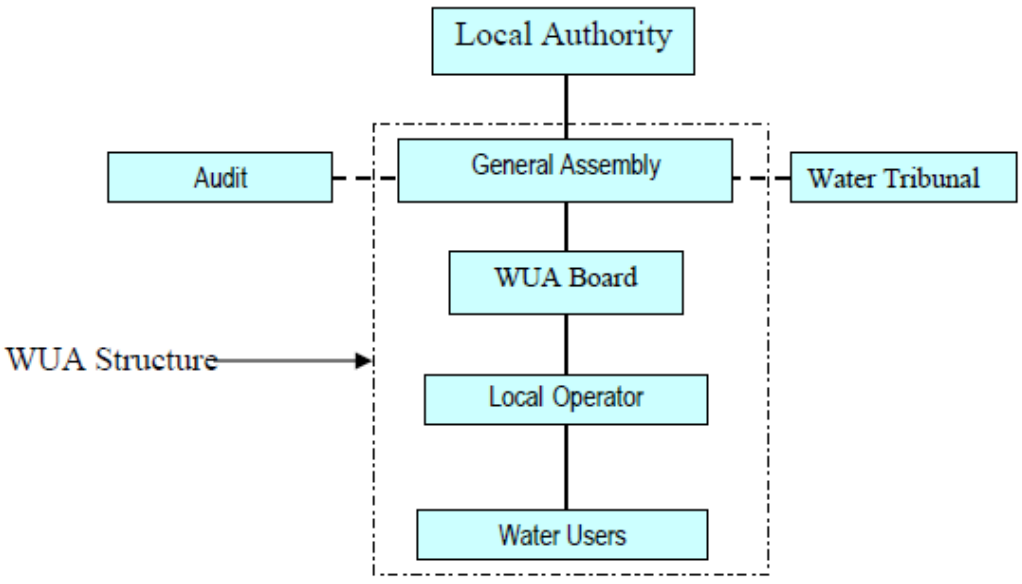

Figure 1: The WUA structure (Source: WUA Guidelines 2010)

2.3 The theoretical framework of the study

Performance management (PM) was used as the guiding framework for understanding and improving the effectiveness of Water Users Associations (WUAs) in rural water supply. According to Adkins (2006), PM entails a systematic management of an organization's strategy execution. Applied to WUAs, PM emphasizes the critical role of effective management in achieving sustained service delivery and performance improvement. Figure 2 displays the operating cycle of performance management.

Figure 2: Operating Cycle of Performance Management (Source: Sattarov and Volkova 2020, page 93)

Sattarov and Volkova (2020) describe the operating cycle of PM as actions leading to results, which are evaluated against benchmarks (intentions, plans, and competitors' results). As applied to WUAs, actions that are undertaken by WUAs lead to outcomes. These outcomes are evaluated against benchmarks. Evaluation Provide feedback on the effectiveness of actions, informing decisions regarding corrective measures or refinements. This iterative process of action, evaluation, and adjustment facilitates continuous improvement in WUA performance.

Furthermore, successful service delivery by WUAs relies on well-functioning relationships and clear institutional responsibilities among stakeholders, as depicted in Figure 3, the 'Triangle of Service Delivery' (UNICEF, 2018). This triangular relationship involves users, service providers, and government agencies, each with defined roles and duties to ensure sustainable water supply.

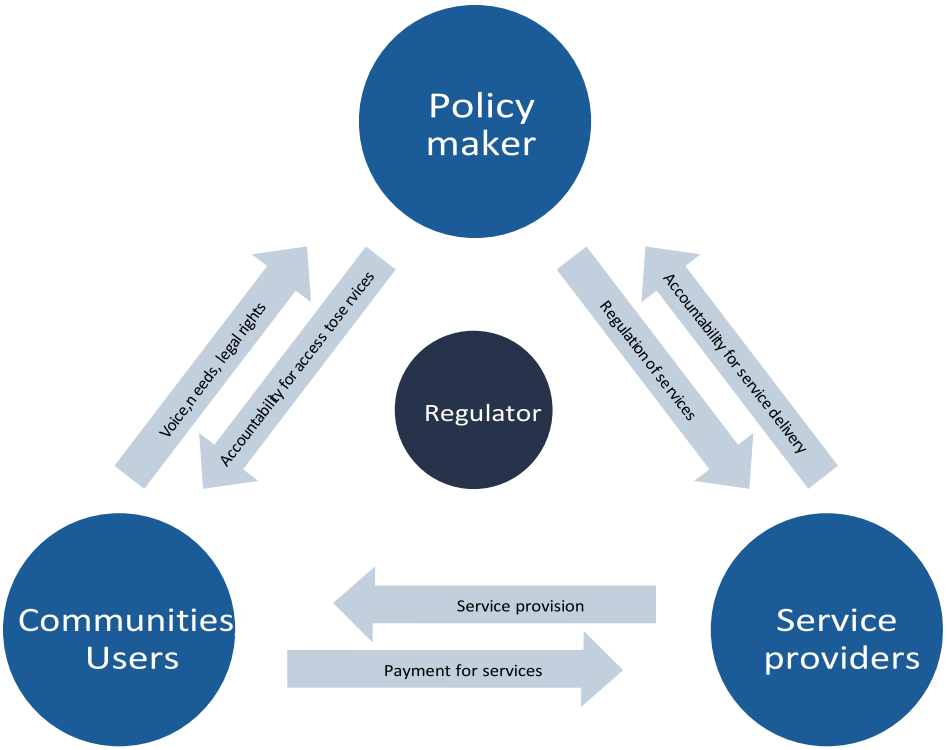

Figure 3: Triangle of Service Delivery (Source: UNICEF, page 23)

Financial sustainability is a cornerstone of WUA's performance. Thus, a water utility is supposed to recover the costs for sustained operations and maintenance. Failure to do so due to some contributing factors shall also mean failure in continued service delivery. If the performance is not being assessed, the water utilities shall not know where and how to improve (De Witte and Marques 2012). In the end, they will fail to sustain the water supply schemes.

Tynan and Kingdom (2002), present a useful framework for analyzing the performance of a water utility, which also allows for comparison between different utilities. They broadly put measures of performance assessment under efficiency of investment, efficiency of operation and maintenance, financial sustainability, and responsiveness to customers. Under these, there are also categorised indicators. Correspondingly, in the International Benchmarking Network (IBNET) for water and sanitation performance blue book, Van Den Berg and Danilenko emphasise measuring the performance of water utilities based on a set of indicators for operational efficiency, financial sustainability, and customer responsiveness.

Choosing appropriate performance indicators is crucial for meaningful assessment, guided by SMART (specific, measurable, achievable, relevant, and time-bound) criteria. The International Water Association (IWA) emphasizes the importance of tailoring indicators to each utility's management strategy and objectives. Therefore, the selection of performance indicators for this study is contextualized based on the study area's characteristics and data availability.

Central to WUA performance is the capacity to sustain operations and maintenance of water supply schemes. Often, utilities in developing countries are locked in a vicious circle, with weak operational and financial capacity, leading to performance failures and inefficiencies, which in turn diminish the capacity to provide quality services (Sattarov and Volkova 2020). Breaking this cycle requires the implementation of effective management strategies to enhance operational and financial performance, ultimately ensuring the delivery of reliable water services to rural communities. Figure 4 shows the vicious cycle of non-performing water utilities.

Figure 4: Vicious cycle of non-performing water utilities (Source: Sattarov and Volkova 2020, page 97)

2.4 Performance assessment

In assessing performance, efficiency (doing things right) and effectiveness (doing the right things) are pivotal considerations across various fields and endeavors (De Witte and Marques 2012). Within the water sector, utilities often exhibit significant performance gaps, largely attributable to market failures such as monopoly power, scale and scope economies, and information asymmetry (Marques 2005). In this context, performance assessment emerges as a crucial tool for guiding managerial decisions, optimizing resource allocation, and enhancing service quality.

A variety of performance measures can be utilized to evaluate performance, including performance indicators, performance indices, and performance levels (Alegre 2007). Performance indicators represent quantified ratios that express the intensity or manner in which a specific activity is accomplished. Performance indicators are primarily employed by operators and regulators to monitor service quality (Alegre 2007).

Performance indices aggregate multiple performance variables into a single value, with examples including Total Factor Productivity and Data Envelopment Analysis. While indices may offer a

more comprehensive view, they can also incorporate subjective judgment values and operate as 'black boxes,' complicating understanding of the transformation process from inputs to outputs. Performance indices are frequently tailored for regulatory purposes, particularly in contexts employing performance-based regulation methods like price caps or yardstick competition.

Performance levels are related to qualitative measures associated with the quality of service provided, typically represented by discrete categories such as 'very good', 'good', 'average', 'poor', and 'very poor'. These categories are particularly useful for the customers to assess service quality, particularly in situations where quantification is challenging (De Witte and Marques 2012).

2.4.1 The Performance of a Water Utility

A well-performing utility is a utility that can provide high-quality water and/or wastewater services to its customers in a sustainable manner (Van Den Berg and Danilenko 2017). This definition considers elements of good financial and operational performance, but also universal access to water and wastewater services that are affordable to all.

Improving utilities' performance requires time and effort, the results of which can only be seen in the context of past performance. It, therefore, makes trend analysis central to the improvement process (IBNET 2011). According to IBNET (2011), the measurement of the performance of water utilities is based on a set of indicators for operational efficiency, financial sustainability, and customer responsiveness.

Operational efficiency assesses the utility's use of inputs in the course of daily management. Operational efficiency depends not only on current management quality but also on past management practices and decisions, as well as on earlier investment decisions. At the same time, the utility's social and economic environment plays an important role in the degree of efficiency

it can attain, because local prices and regulations (including environmental and labor regulations), among other factors, affect efficiency levels. Two indicators are used to measure operational efficiency: nonrevenue water and staff productivity.

The second key performance measure is financial sustainability. A utility that fails to cover at least its operation and maintenance costs from operating revenues is in a precarious position, often leading to an inability to maintain infrastructure and to consequent deterioration in service quality. Even when operating revenues are sufficient to cover operating costs, however, a utility may still experience cash flow problems if customers do not pay their bills or pay them late. Therefore, the two indicators used to determine financial sustainability are the operating cost coverage ratio and collection period (the time it takes the utility to collect from its customers).

The utilities' customer responsiveness can be measured in many ways. The indicator, which can be used is the affordability of service, as measured by how much of a household's income goes to water supply and sewerage services. Affordability also provides insight into the long-term sustainability of a utility; if its services are not affordable for its current population of consumers, the system will not be able to expand rapidly to serve larger, and often poorer, populations.

2.4.2 Tynan and Kingdom's framework for analyzing performance.

The topic of performance is elaborated upon by looking at a useful framework for analyzing the performance of a water utility as provided by Tynan and Kingdom (2002). The framework was originally developed for benchmarking, meaning that the framework would allow for a comparison between different utilities. They proposed seven performance categories namely; operational efficiency, cost recovery, commercial performance, coverage and access, asset maintenance, service quality, and price and affordability.

Operational efficiency refers to the lowest cost of the day-to-day operation of a utility in terms of labour, energy, water, and materials, with the most resourceful combination partly dependent on local input prices and prior capital investment decisions. The ratios suggested for this indicator are the number of staff per 1000 connections and staff per 1000 people served.

In terms of cost recovery, there must be adequate funding to meet capital investments and operational costs as it is fundamental for a utility to deliver water services of adequate quality.

Commercial performance is another category whose suggested indicator is the collection period, which refers to the ratio of 'accounts receivable' to the annual revenues.

For coverage and access, Tynan and Kingdom (2002), suggest that appropriate levels of service mean that not every household must have an in-house connection. Rather, each household should have access to a sufficient level of service (for example by way of yard connections, block connections, public stand posts, etc.).

On asset maintenance, non-revenue water is often used as an indicator of the state of the service provision network. The idea is that the level of NRW will be lower when the condition of the service provision network is better. The target level of NRW, as proposed by Tynan and Kingdom, is less than 23%.

Service quality is indicated by such indicators as the quality of water supplied, the pressure at which the water is supplied, and the availability of services. Tynan and Kingdom (2002) put forward 'continuity of service' as the main indicator with which to measure the level of service quality.

It should be noted that because Tynan and Kingdom's framework was primarily designed for benchmarking purposes, the indicators they selected might not necessarily represent the best

possible indicator for a selected dimension. This is because they also use the criterion of availability of information of the indicator for its selection. Consequently, another indicator would better describe a certain dimension. However, if information concerning that indicator is not commonly collected, then for benchmarking purposes that indicator may not be very useful.

This framework has been widely used in various studies for benchmarking purposes and performance assessment in water supply utilities.

2.4.3 Drawbacks of the Tynan and Kingdom's framework

The framework presented by Tynan and Kingdom (2002) can be very useful in the sense that it highlights different dimensions of performance and allows for cross-case comparisons. At the same time, as with any framework, it has its limitations (Schwartz 2007).

The first limitation concerns the ability to exhaust a dimension in a few indicators. It is not really possible to adequately cover the width of a dimension by only looking at one or two indicators. Tynan and Kingdom (2002) note that in some cases, the indicators they propose should be approached with some caution. For example, unaccounted-for-water (UfW) covers other practices apart from asset maintenance.

The second limitation is that, in some cases, Tynan and Kingdom (2002) seem to contradict their own definitions. For example, operational efficiency, as they defined it, "refers to the lowest cost use of labor, energy, water, and materials in the day-to-day operation of a utility, with the most efficient combination partly dependent on local input prices and prior capital investment decisions". However, the two indicators subsequently suggested by Tynan and Kingdom (2002) only relate to labor. The use of other resources (such as energy, water, and materials) is not covered by their indicators. This is particularly important when comparing low and middle-income

countries as some will have low labor costs while industrialized and some with high labor costs. The latter will have a strong incentive to reduce the number of employees, thus scoring well on Tynan and Kingdom's indicator of operational efficiency. Low and middle-income countries may have much less incentive to reduce the number of employees (also because the achieved savings may not be considerable). As a result, Tynan and Kingdom (2002) do not appear to look at the local input prices but rather equate operational efficiency with labor productivity (Schwartz 2007).

A third question relates to the enquiry if the framework incorporates all dimensions in all locations. In the Netherlands, for example, few consumers are really bothered about the price of water. The most important dimensions of performance in a country like the Netherlands are not the efficiency of operations, the level of coverage, or price and affordability. This means that rather than focus on efficiency, affordability, and price as indicators of performance, in a country like the Netherlands, reliability and trustworthiness are much more important. As such the framework needed to integrate indicators in dimensions considering all locations (Schwartz 2007).

2.4.4 Performance indicators used in the study

The broad category of performance indicators used in this study have been based on the three elements as defined by Van Den Berg and Danilenko (2017), namely financial performance, customer performance and operational performance. Some indicators under the mentioned performance categories have been adapted from the Tynan and Kingdom (2002) framework.

The selected variables under financial performance include the working ratio and the period it takes for the WUAs to collect water revenues. Reliability of the water utility, affordability of water tariffs, and quality of the provided service constitute the selected variables under the customer performance indicator. For operational performance, the selected variables include non-revenue water quantification and staff efficiency in the WUAs.

2.5 Performance Gaps in Water Utilities

Challenges have been observed across water utilities in both rural and urban setups. According to the Malawi Sector Performance Report (2012), it indicated that there were signs that WUAs were struggling to provide sustainable piped water services due to reduced numbers of functional taps. Similar findings have been reported by Mangum (2017) who stresses the need for post-construction support to the rural water utilities, which are performing at unsustainable levels in Amazonas. As also reported by Tiroyamodimo (2007), the Zambian Nation Water Supply Council resorted to reforms aimed at redressing the challenges which were faced by water utilities amongst which were unclear roles and responsibilities of the water institutions, low investment in the sector, low-cost recovery and overstaffing.

A recent report from the Ministry of Water And Sanitation (2023) on the WUAs across the country, outlines the following challenges faced by the rural water supply schemes, which constitute the performance gaps: Political interference, lack of capacity building for leaders to run the WUA, excessive vandalism and theft, low operation, and maintenance fees, lack of technical expertise to analyze water quality, encroachment of river catchment areas, aging infrastructure, high water treatment costs and inadequate water treatment capacity.

Addressing these gaps will ensure quality service delivery and enhance the optimal functioning and sustainability of all WUAs.

2.6 Factors affecting the performance of water utilities

Peter and Nkambule (2012), in their study investigating factors affecting the sustainability of rural water schemes in Swaziland, found that non-involvement in decision making, lack of willingness to contribute funds, absence of users committee, and lack of cooperation between local leaders and the users committee were the main factors which made the schemes unsustainable. They further

suggested that water service providers should address the technical, social, financial, and institutional factors, affecting sustainability in running the rural water schemes. Interestingly, they highlight that technical and social factors are the critical ones for sustainability in the water schemes as compared to financial and institutional factors which are also important but play a lesser role in the sustainability of the schemes. It is on the contrary that financial factors are critical when it comes to Malawi's rural water supply schemes.

Further, following the recent report from the Ministry of Water and Sanitation (2023) on the WUAs across the country, some critical issues identified to be contributing to poor operation and maintenance include the following:

a) Lack of trained personnel: Most rural water supply systems lack trained personnel. Many communities do not have experts or technicians who are knowledgeable in the operation and maintenance of water supply systems. This leads to a lack of proper monitoring, regular maintenance, and timely repairs, resulting in breakdowns and water shortages.

b) Limited financial resources: Rural communities often have limited financial resources to invest in the operation and maintenance of water supply systems. They often lack the funds to purchase spare parts, hire maintenance staff, or conduct regular system assessments. This financial constraint hampers the proper functioning of the water supply systems and prevents effective maintenance and repairs.

c) Weak institutional framework: The institutional framework for managing and maintaining rural water supply in Malawi is fragmented and requires improvements. There are several stakeholders in rural water supply. System operation and maintenance responsibilities are not clearly defined, leading to confusion and a lack of accountability. This fragmentation makes coordinating efforts, implementing effective monitoring systems, and ensuring proper maintenance practices difficult.

d) Inadequate infrastructure: Many rural water supply systems suffer from inadequate infrastructure, such as outdated or damaged equipment, unreliable power supply, and poorly constructed infrastructure. These infrastructural deficiencies result in frequent breakdowns and reduce the overall efficiency and effectiveness of the water supply systems.

e) Limited community involvement and ownership: Lack of community involvement and ownership is another contributing factor to Malawi's poor operation and maintenance of rural water supply. When communities do not feel a sense of ownership over the water supply systems, they are less likely to participate in their maintenance actively, leading to neglect and improper care of the infrastructure.

f) Lack of monitoring and evaluation: The absence of regular monitoring and evaluation mechanisms makes it difficult to detect and address operational and maintenance issues on time. Problems can go unnoticed without proper monitoring, leading to more significant breakdowns and water supply disruptions.

g) Climate change and environmental impacts: Climate change and environmental factors pose additional challenges to the operation and maintenance of rural water supply in Malawi. For instance, droughts, floods, and other extreme weather events can damage infrastructure and reduce the availability of water resources, further burdening the already fragile systems.

These themes represent a broad overview of the literature on factors that affect the performance of rural water supply schemes.

2.7 Gaps in Literature

In the realm of rural water supply in Malawi, WUAs stand as vital conduits for facilitating service delivery to rural populations while ensuring equitable access to clean water. There are, however, some observed gaps in the literature across several studies pertaining to the performance of rural water supply schemes, which include the following:

- Limited consideration of user perspectives: Studies often overlook the perspectives and experiences of water users in assessing the performance of rural water supply schemes. Understanding user satisfaction, perceptions of service quality, and preferences can provide valuable insights for improving the design and management of water supply interventions as well as the conduct of service providers.
- Inadequate monitoring and evaluation: Many studies lack robust monitoring and evaluation frameworks to assess the performance of rural water supply schemes objectively. There's a need for standardized indicators, data collection methods, and evaluation criteria to facilitate comparisons across different schemes and contexts.
- Little comparative studies amongst WUAs' performance in Malawi.

This study attempts to fill these gaps by assessing performance and exploring the various factors that influence the performance of rural water supply schemes while considering customer perceptions.

2.8 Section summary

In summary, this literature review has examined the role of Water Users' Associations (WUAs) in managing rural water supply schemes. It has also given an explanation of performance-assessment frameworks and identified key success factors, challenges, and best practices for rural water supply schemes while drawing on empirical evidence, case studies, and theoretical frameworks.

CHAPTER 3: MATERIALS AND METHODS

3.1 Chapter introduction

This chapter outlines the methods that were employed to carry out the research. It describes the study area, the research design adopted in the study, the sampling methods used in data collection, and the description of data analysis methods.

3.2 Study area

The research was carried out in Zomba District, an area covering 2,580 km² located along Latitude -15.351902 Longitude 35.010796 and Latitude -15.452756 Longitude 35.665983 South-East of Malawi. The district has a population of 746,724 (NSO 2019) and it shares boundaries with Machinga District to the North, Balaka District Northwest, Mulanje and Phalombe Districts to the South, Chiradzulu and Blantyre Districts to the Southwest and the Republic of Mozambique to the East. Figure 5 displays the Map of Zomba and the locations of the WUAs.

The rural water supply sector in the district is still faced with other challenges, such as degradation of water catchment areas, inadequate institutional capacity, theft and vandalism of water facilities, climate change, inadequate promotion of hygiene and sanitation, inefficient revenue collection, nonfunctional/old structures, and failure to satisfy demand (Zomba District Council 2017). The gravity fed schemes which are operating in the district under WUA management include Malosa, Zomba East, Zomba West, Makhwawa North, and Makhwawa South. Mayaka WUA operates using pumps, which abstract water from boreholes. Jali WUA was dissolved in 2016 and now the community is supplied by SRWB and some areas by Zomba East WUA.

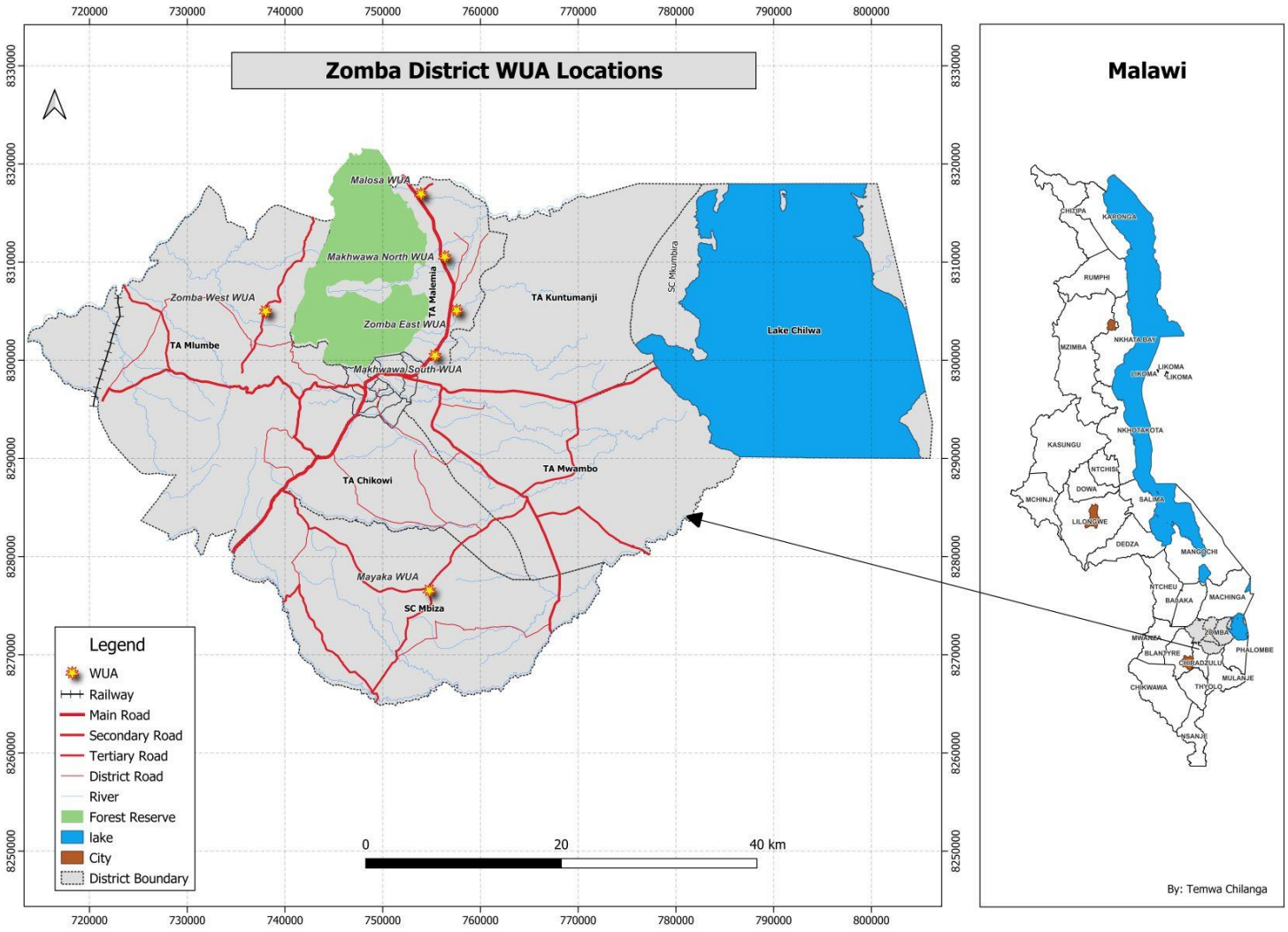

Figure 5: Map showing the study area.

3.3 Research design

The research study adopted a mixed research approach, whereby both quantitative and qualitative research methods were used to collect qualitative as well as quantitative data from primary and secondary data sources. This was so to collect comprehensive data to achieve the research objectives. Mixed methods help in gaining a more complete picture than a standalone quantitative or qualitative study, as it integrates the benefits of both methods (George, 2021).

3.4 Sampling framework and methods

There is currently a total of six operational WUAs managing rural water supply schemes in Zomba district which were assessed, including one which was dissolved. Non-probability sampling methods were used in the study to select research subjects in the WUAs. A purposive sampling technique was used to determine participants in the customer survey, key informant interviews (KII), and focus group discussions (FGD). The WUA secretariat was selected to participate in the KIIs since it is the technical group undertaking responsibility in water service delivery. Variables regarding the operational, financial and customer performance were, therefore, collected during the interviews. The FGDs comprised of the WUA board members and secretariat and data on the factors affecting WUA performances was obtained. WUA customers were also interviewed to obtain complementary data on customer performance. The targeted customers included those having a shared connection, private connection, and communal taps. The sample size depended on the saturation of responses and a total of 30 connections were assessed in the WUAs.

3.5 Determination of selected performance indicators

Based on Van den Berg and Danilenko (2017) the analysis looked at three elements with their underlying indicators to define a well-performing utility; financial performance, customer performance (an index that covers the quality of access to water services), and operational performance. Some indicators have been augmented from the Tynan and Kingdom framework' which befits under the three above-mentioned elements. The International Water Association advocates proper performance indicator selection according to the water utility type and data availability. The chosen Indicators for Zomba WUAs under the performance elements are summarized in Table 1.

Table 1: Selected performance indicators in the study

INDICATOR	VARIABLES	TARGET	REFERENCE
Financial Performance	• Working ratio - Total annual income collected: total annual operating expenses • Fee collection period	≥ 1 Challenges in revenue collection	Tynan & Kingdom 2002
Customer Performance	• Reliability - hours of water supply • Affordability - Cost of new connection and waiting time - Water tariffs payment • Quality of service - Water quality - Customer satisfaction - Customer relations/ responsiveness	24 hrs Ability to afford tariffs Treated water. < 3 days	Tynan & Kingdom 2002 Customers perception Malawi Bureau of Standards Tynan & Kingdom 2002
Operational Performance	• Non-revenue water (illegal connections and physical water losses) • Staff efficiency (Number of staff per 1000 connections)	Ability to quantify. < 5	Tynan & Kingdom 2002

The selected variables under financial performance include the working ratio and the period it takes for the WUAs to collect water revenues, with targets adopted from Tynan and Kingdom (2002). The working ratio was measured by dividing the total revenue collected annually by the total operating expenses of the water utilities. A ratio of ≥ 1 was considered the benchmark of better financial performance, thus WUAs with values below the target were classified to have poor financial performance and vice versa. The fee collection period was determined by the WUAs' ease of collecting revenue from their customers.

Reliability of the water utility, affordability of water tariffs, and quality of the provided service constitute the selected variables under the customer performance indicator with target references from Tynan and Kingdom (2002), Malawi Bureau of Standards, and the customers' voices. Reliability of the WUAs was determined by the hours the water utilities were able to supply water to their customers daily (24 hours) and from the customer's perspective if they were supplied with enough water per requirement. Affordability was determined through the customer's viewpoint on the rates of water tariffs and from the interviews if the WUA secretariat received complaints about the water tariffs. Quality of service looked at the quality of water, customers' satisfaction, and responsiveness to customers. The determination of these variables was through the customers' perception and the ability of the WUA secretariat to supply treated water and their responsiveness to its customers.

For the final indicator which is operational efficiency, the selected variables include non-revenue water and the efficiency in WUA staffs with targets adopted in the Tynan and Kingdom framework as well. Non-revenue water was determined by the utilities' ability to quantify physical water losses in their water systems. Staff efficiency was determined by the total number of WUA staff serving the population of customers in their jurisdiction.

3.6 Data collection

For the first objective, a checklist (Appendix 3) was administered during KIIs to obtain performance measures pertaining to financial performance on the listed variables in Table 1 whose respondents were the WUA secretariat. The KIIs were done in all the 6 operating WUAs.

For the second objective, part of the data was collected through KIIs where a checklist was administered (Appendix 3) to obtain performance measures pertaining to customer performance on the listed variables in Table 1 whose respondents were the WUA secretariat. Data was complemented by carrying out a customer survey in 5 operating WUAs to customers in communal, shared, and private connections. The administered questionnaire (Appendix 5) was programmed in Kobo-collect.

For the third objective, a checklist (Appendix 3) was administered during KIIs to obtain performance measures pertaining to operational performance on the listed variables in Table 1 whose respondents were the WUA secretariat. The KIIs were done in the 6 operating WUAs.

Finally, for the fourth objective, which is to examine factors influencing WUA performance, qualitative data was collected through focus group discussions from both the dissolved and operating WUAs and complemented by the KIIs. The FGDs were done in all the 6 operating WUAs and 1 (Jali) WUA which was previously dissolved. A guide (Appendix 4) was used during focus group discussions. The FDGs included WUA board members and the secretariat as participants.

3.7 Data analysis

In the first objective, the measures of central tendency typically under descriptive statistics were used in analysis of the collected data by generating tables and charts using SPSS software and Microsoft Excel.

For the second objective, the measures of central tendency typically under descriptive statistics were used in the analysis of the collected data by generating tables and charts using SPSS software, Kobo Toolbox, and Microsoft Excel.

For the third objective, the measures of central tendency typically under descriptive statistics were used in the analysis of the collected data by generating tables and charts using SPSS software and Microsoft Excel.

Finally, in the fourth objective, thematic analysis was used as a qualitative data analysis method in assessing factors contributing to the performance of the WUAs. Themes were extracted based on the accounts/storylines of the participants during the discussions.

CHAPTER 4: RESULTS

4.1 Chapter introduction

This chapter presents the findings of the study. It outlines results on the performance of the WUAs in Zomba District in variables under financial, customer, and operational performance indicators. It also outlines the identified performance gaps and the issues affecting the overall performances of the WUAs. Refer to Appendix 6 and 7 for more information on the research findings.

4.2 Household characteristics

Taking into account the customer survey, most of the interviewed respondents were females with a representation of 71%. The majority of the customers (71%) were above the age of 35 while the rest ranged from the age of 21-35. Most of the respondents (95%) reported being married and the average number of people per household was 5. All the interviewed customers were from non-metered connections and 52% were from shared connections.

4.3 Financial performance of the WUAs

This section presents findings on the working ratio as calculated in the WUAs and the fee collection period.

4.3.1 Working ratio

The only WUA that was found to achieve the target of a working ratio of >1 (revenue generated/expenses) was Zomba East WUA. The rest of the WUAs were found to have a working ratio of <1, which means that they generated little revenue compared to their expenses annually. Zomba East WUA registered a 1.10 ratio and Mayaka WUA was found operating at a ratio of 0.8. Malosa, Zomba West, Makhwawa North, and Makhwawa South WUAs did not have clear records to help in estimating their annual operation and maintenance costs to calculate their working ratio. Nevertheless, it was clearly stated by respective scheme managers and WUA board members that

they operated on negatives. This is to say that all the revenue generated annually, proceeds to partially cover O&M costs and with deficits. Table 2 displays the financial performance results.

Table 2: WUAs Financial performance

NAME OF WUA	WORKING RATIO	GAP/DEVIATION
Zomba East	1.1	+0.1
Malosa	-	-
Makhwawa North	-	-
Makhwawa South	-	-
Mayaka	0.8	-0.2
Zomba West	-	-

- = data not available

4.3.2 Fee collection

Zomba East WUA collects almost 70% of the required revenue within a month and the utility can operate and maintain the water supply scheme as indicated by the scheme manager and WUA board members. All WUAs, except one, indicated that they have challenges in the collection of revenue. It takes a longer period for the WUAs to collect a significant amount of water tariffs from customers to utilize in daily operations, except for the Zomba East WUA, which indicated otherwise.

4.4 Customer service and user perceptions towards WUAs' performance

4.4.1 Reliability

It was indicated by the WUA staff and board members during the interviews from all the WUAs that they can provide water to their customers for 24 hours most of the time, except when there are breakages and during the dry season/months when there are decreased water levels in their water source. Mayaka WUA supplies its customers with water for only 4 hours a day. Only 2 out of 6 WUAs provide water to most sections in their total targeted area. The other WUAs are moderately able to provide water in some of their designated sections in their plans while other areas have dry taps. Of the four WUAs with moderate coverage, 2 WUAs (Zomba West and Makhwawa South) registered complaints during the survey from customers on the issue of not having adequate hours of water supply. This contrasted with responses from the respective WUAs during the key informant interviews.

Most of the customers (68%) indicated that they were supplied with water for about 12-24 hours, 18% of the customers for about 5-12 hours, and 14% for about 0-5 hours. In terms of their perception of the WUA's reliability, 82% of the interviewed customers indicated that the WUAs are reliable, 13% indicated they are somewhat reliable while 5% indicated that they are not reliable. Figures 6 and 7 display the results from the customers' perspectives.

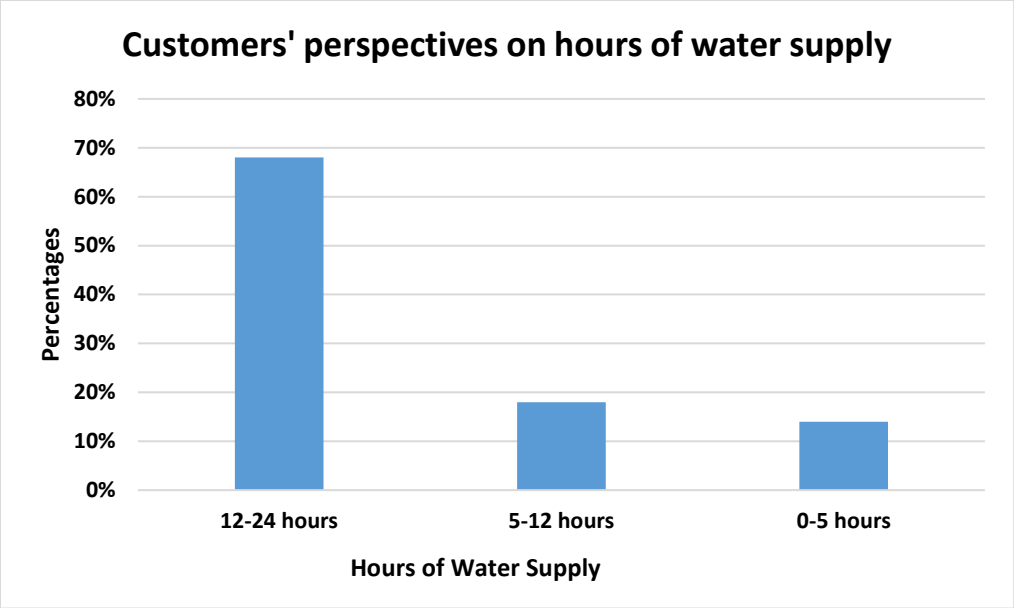

Figure 6: Customers' perspectives on hours the WUAs supply them with water.

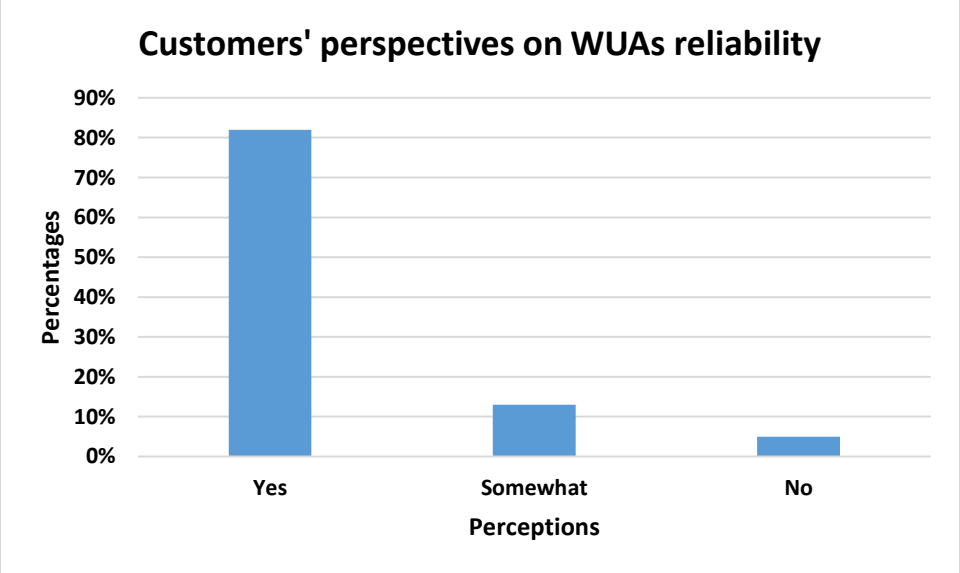

Figure 7: Customers' perspectives on WUAs reliability

4.4.2 Affordability

Following the key informant interviews, half (3) of the WUAs indicated that they have ever received complaints on tariffs from their customers. Furthermore, none of the WUAs had tariff-reduction plans following the complaints. In the subsequent customer survey, 2 out of the 6 WUAs (Zomba East and Makhwawa South) registered complaints from their customers that they found water tariffs to be on the higher side. Table 3 displays the water tariffs as charged in the WUAs. Some WUAs did not distinguish the water tariffs for shared and private connections whilst some did. Only one WUA charged an extra cost for an additional household in the shared connection. Following the customer survey, 73% of the customers indicated that there was no need for reducing the water tariffs while 27% proposed a reduction in tariffs. On the cost of new connections, 64% indicated that it to be not expensive while 36% indicated that it is somewhat expensive. None of them indicated that the tariffs were expensive.

Table 3: Water tariffs for Zomba WUAs

NAME OF WUA	PRIVATE TAP	COMMUNAL TAP	ADDITIONAL COST ON SHARED PVT CONNECTION
Zomba West	1000	1000	-
Malosa	600	600	-
Zomba East	2500	350 /household	600/ additional house
Makhwawa North	1500	2000	-
Makhwawa South	2000	2000	-
Mayaka	700/m^3		

- = data not available

4.4.3 Quality of Service

4.4.3.1 The quality of water supplied.

Only one-third of the WUAs (2/6), were discovered to have a routine of consistently applying chlorine to abstracted water before supplying it to consumers during the key informant interviews. Another one-third only applies chlorine to water at times whenever convenient. Finally, another one-third of the WUAs never apply chlorine to the water after abstraction, the water is conveyed to consumers in the form it was at the intake as shown in Figure 8.

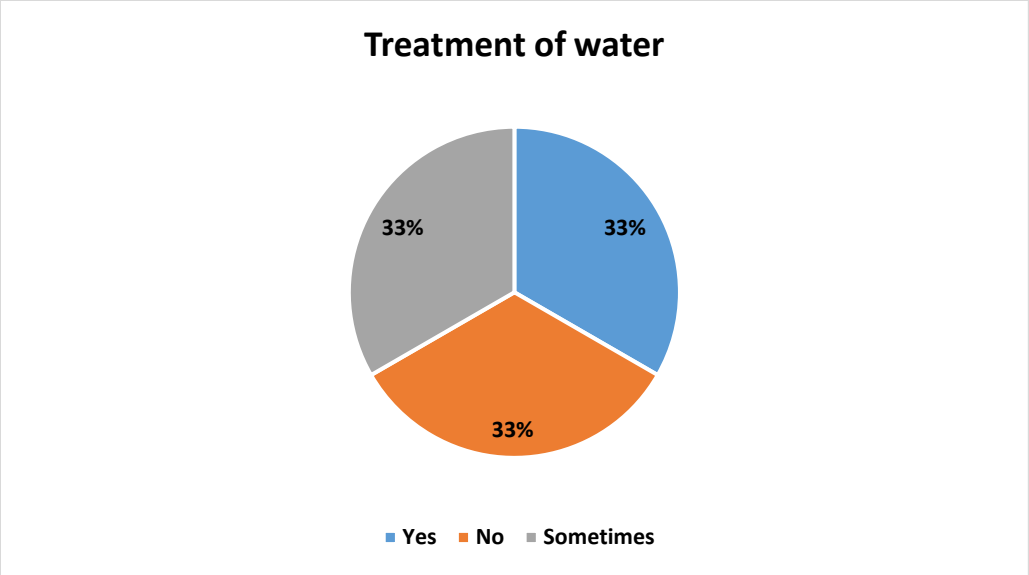

Figure 8: WUAs treating their water.

Complaints from customers in all the gravity-fed systems were registered concerning the turbidity of the water. According to the customers, turbid water was experienced at times, especially, during the rainy season which made them look for alternative drinking water, such as from boreholes. Results from the customer survey indicated that 82% of the customers perceive the water supplied by the WUAs to be of good quality, 9% perceive the water to be of good quality sometimes whilst 9% perceive it to be not of good quality as depicted in figure 9.

Figure 9: Customers' perspectives on the water quality supplied by WUAs

4.4.3.2 Customer responsiveness

It was indicated by the secretariat and board members in all the WUAs during the key informant interviews that they address complaints and queries brought forward by their customers timely. Furthermore, it was also stressed that hastiness in addressing some issues brought forward depends on the availability of resources. During the customer survey, most responses were in tandem with responses from the KIIs, except for the registered complaints in one WUA (Zomba West) as displayed in Figure 11. It was indicated by 86% of the customers that the WUAs gave timely responses once there were complaints and other issues. 5% indicated that responses were timely sometimes while 9% indicated that the responses were not timely. Figure 10 depicts the customers' perspectives.

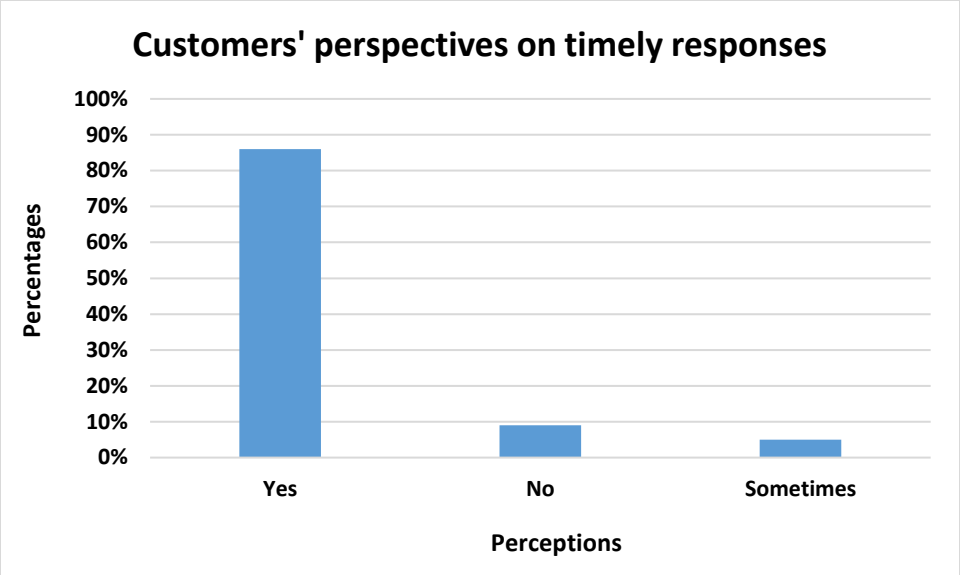

Figure 10: Customers' perspectives on responsiveness

4.4.3.3 Customer satisfaction

Data on customers' satisfaction was collected from the customers only. The most prominent issue that customers raised is related to water quality. The expressed dissatisfaction was due to turbid water, which comes out of their taps at times, especially, during the rainy season. It was reported that the water during the rainy season is mostly turbid due to turbulence of water from the source. As such, they use alternative water sources, such as boreholes for drinking purposes. Complaints on WUAs reliability were registered in Zomba West and Makhwawa South. Complaints on affordability were reported by some consumers from Zomba East and Makhwawa South. Some complaints on customer responsiveness and overall satisfaction with the service of the WUA were registered at Zomba West WUA only. Figure 11 displays an aggregate of the registered complaints from the WUAs. Considering responses on the overall satisfaction of the customers with the

WUAs, 95% expressed satisfaction with the service delivery while 5% indicated that they were not satisfied with the WUA's service delivery.

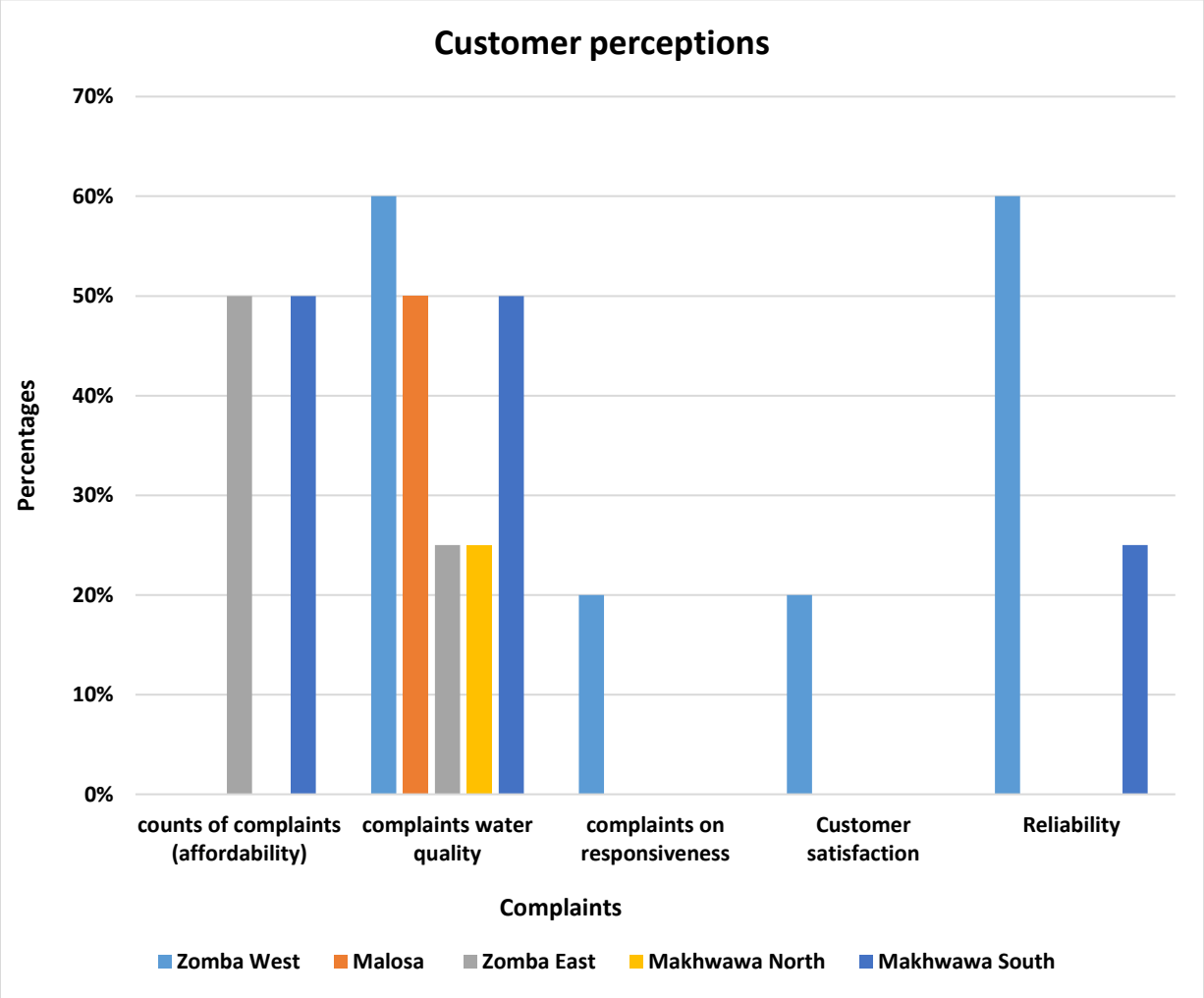

Figure 11: Customer perceptions on quality of service

4.5 Operational performance of the WUAs

4.5.1 Non-revenue water management

In terms of non-revenue water, only Mayaka WUA was observed to have means of tracking the water quantity produced and billed. All the other WUAs do not have any means of tracking how

much water they produce and bill, including their water losses. Five WUAs reported to have registered cases of illegal water connections, which contribute to operational losses. Makhwawa North WUA, which did not report any cases of illegal water connections still incurs these losses due to theft and breakage of pipes. Water losses are worsened by the old infrastructure of the water supply schemes, which requires regular maintenance.

4.5.2 Staff efficiency

As regards staff efficiency, all WUAs go beyond the target of less than 5 staff per 1000 connections. This is indicated in Table 4.

Table 4: Number of WUA staff per serving

NAME OF WUA	No. OF STAFF	NUMBER OF CONNECTIONS	STAFF PER 1000 CONNECTIONS
Zomba West	20	250	80
Malosa	8	976	8
Zomba East	18	2236	8
Makhwawa North	5	264	19
Makhwawa South	5	300	16
Mayaka	6	202	29

Except for Zomba East and Mayaka WUAs, the data on the number of connections by the rest of the WUAs was given at a time when they were functioning at full capacity. It was reported that functional connections might be less than the indicated figure in the document, due to some areas, which they are not managing to supply them with water. Therefore, the number of staff per 1000 connections for the four WUAs as indicated in the succeeding table is the maximum they can achieve if functioning at full capacity. There are prevailing gaps in staff efficiency as all the WUAs are above the benchmark of 5 staff per 1000 connections as displayed in Table 5. Malosa and Zomba East WUAs almost hit the target whilst there is a bigger deviation from the observed values of the other WUAs.

Table 5: Staff efficiency deviations

WUA	**VARIABLE**	**OBSERVED VALUE**	**BENCHMARK**	**GAP/** DEVIATION
Zomba West	Staff/1000 connections	80	5	+ 75
Malosa	Staff/1000 connections	8	5	+3
Zomba East	Staff/1000 connections	8	5	+3
Makhwawa North	Staff/1000 connections	19	5	+14
Makhwawa South	Staff/1000 connections	16	5	+11
Mayaka	Staff/1000 connections	29	5	+24

4.6 Factors affecting the performance of WUAs

Following the KIIs and FGDs, a number of factors that affect the performance of the WUAs in the Zomba District were identified. Almost all the WUAs indicated that the pre-indicated themes have an impact on the WUA performance, except for social and technological factors. The factors were assessed amongst the 6 operating WUAs, including the one which was previously dissolved. Other issues emanating from the discussions, which affect the performance of the WUAs were identified. These include the systems of the WUAs, old infrastructure, and lack of resources. Table 6 displays the factors in order of their occurrence in the WUAs.

Table 6: Factors affecting WUA performance

FACTORS	**MODE OF OCCURRENCE**
Financial	7
Scheme design capacity and old infrastructure	7
Management approaches	7
Resources	6
Policies	5
Governance	4
WUA systems	4
Technological	0
Social	0

4.6.1 Policy factors

It was reported by 5 out of the 7 WUAs that they are affected by policies governing rural water supply projects. It was pointed out that the policies do not provide a supportive environment to ensure the sustainability of these rural water supply schemes, especially when it comes to their implementation. This was highlighted with regard to the role of the government in supporting these WUAs. Less support is being given to these WUAs by the government.

4.6.2 Governance factors

It was hinted by 4 out of the 7 WUAs that their performance was affected by governance factors. Some WUAs have constitutions, but there was no community involvement including the WUA leadership in its drafting. Low levels of adherence because of little awareness and no civic education about the legal framework were reported during the focus group discussions. Amongst the 6 WUAs that are operating currently, 2 do not have a Scheme Manager/Local Utility Operator as per WUA structural requirements. It was also reported in most of the WUAs during the discussions that leaders require supplementary training.

4.6.3 Financial factors

Following the focus group discussions held in the WUAs, it was gathered that the performance of all the WUAs was affected by their financial status. Informants from Jali WUA, which is defunct at present, indicated that it was because of the same issue the dissolution of Jali Water Users Association occurred.

4.6.4 Management approaches

In terms of management approaches, it was expressed by all the WUAs during the key informant interviews that they wished for changes in the WUA management system. The main plea was that

the government should be providing them financial support towards some of their scheme operations and management.

4.6.5 WUA systems

On the WUA systems, 4 out of 7 WUAs were discovered to have a poor system of record keeping, including finances. As such, these WUAs have no clear track of their operational costs and income, generally.

4.6.6 Resources

Most of the WUAs (6/7) including the one that was dissolved, indicated challenges in mobilising sufficient resources for operation and maintenance. This factor is, however, also interlinked with the overall financial status/performance of an institution.

4.6.7 Scheme design capacity and infrastructure

In terms of design, WUAs having a gravity-fed water supply system indicated being impacted by the aging infrastructure. In addition, the current population is not being supplied with enough water as previous designs catered for a lower population. The old infrastructure also contributes to more water losses due to regular breakages and leakages. The WUAs abstracting water from boreholes using pumps, which are similar to the system the dissolved WUA had, have issues with few boreholes and pumps to supply a wider coverage as well as high operational and maintenance costs (as the pumps are susceptible to malfunctions). All WUAs that are currently operating expressed a similar concern.

4.6.8 Technological factors

Following the FGDs, it was observed that secretariats in all the WUAs have enough knowledge and capacity required in operating and maintaining the scheme infrastructure and that they are familiar with their scheme designs, and markets for spare parts are readily available.

4.6.9 Social factors

It was reported in all the WUAs that the communities in the WUAs play a part in decision making and there is user involvement in the O&M of the water supply system. The water users/community are also at liberty to access information of interest from the secretariat.

4.7 Section summary

This section has presented the research findings from the key informant interviews, focus group discussions, and customer surveys in the study area. An outline of results in performance indicators and factors affecting the performance of WUAs has also been presented.

CHAPTER 5: DISCUSSION

5.1 Chapter introduction

In this chapter, the results of the study presented in the previous chapter are consolidated and discussed in line with the performance of the WUAs, focusing on the performance indicators, the observed gaps in the water utilities, and the factors influencing the performance of the WUAs.

5.2 Financial performance of the WUAs

5.2.1. Working ratio

The WUAs have portrayed their inability to cover their operational expenses and maintenance costs since only one of them achieved the target on this variable. Better financial performance is a prerequisite for the sustainability of these WUAs because failure to cover their costs leads to under-investments in assets, weakened operations, and a decline in service quality. The WUAs indicated that they cannot sustain major maintenance works, such as rehabilitations and extensions as they would require external support. Mohanty and Rout (2023) emphasise that maintaining a financially sustainable pipe water supply is one of the serious challenges in the sustainable provision of water supply in rural areas. This is exacerbated by poor revenue collection and willingness to pay for the service.

A study on the performance of utilities in Africa by Van den Berg and Danilenko (2017), further stresses that utilities' negative cash flow leads to decreased service levels, postponing maintenance and payments to suppliers and/or if available, increasing its dependence on government subsidies. This has been observed in Zomba WUAs and efforts towards improvement of these WUAs' cash flows for them to maintain a proper ratio are a necessary intervention.

5.2.2 Revenue Collection

Data in most of the Zomba WUAs on precise monthly and yearly sales of water/revenue collected was not available to calculate their collection period. It was therefore assessed whether the WUAs face challenges in collection of water tariffs from customers when bills are due so that the payments contribute to operational and maintenance costs of the scheme in time. This is in tandem with what Tynan and Kingdom (2002) stipulate that the financial sustainability of a water utility requires the timely collection of revenue from consumers.

Mohanty and Rout (2023) stipulate that inactive community participation, the notion of free water supply, and unaccountable payments are the main reasons for poor revenue collection. A bigger proportion of WUAs indicated that they faced challenges in collecting revenue and some users left bills unpaid for several months. Resultantly, this affects the operations and maintenance of the rural water supply schemes. The Zomba East WUA is the only rural water supply scheme, which indicates that it does not face challenges in revenue collection. This is because the WUA collects almost 70% of the required revenue within a month and operation costs are not affected by inefficiency in revenue collection as indicated by the Scheme Manager and WUA board members.

In instances where only part of the required revenue is collected, incapacitation of the schemes' operations is inevitable due to insufficient funds. Tynan and Kingdom (2002), argue that although poor collection efficiency is usually blamed on customers, the utility may also be at fault for delayed and faulty billing (for metered utilities), inadequate responses to consumer queries on billings, poor customer service, and a lukewarm effort to collect overdue accounts. The reduced willingness to pay is evident in the WUAs, and there are also consequences of consumers experiencing erratic water supply or no supply at all for a certain period in some WUAs (Quote from customer: '*I see no reason of paying the bill if water comes out a few times in a week or*

month'). With a reduced customer base, returns from water tariffs are reduced, thereby WUAs experiencing a decline in financial sustainability. This is in tandem with the study findings of Abualtayef et al, (2019), a study whose analysis indicated that there were different reasons for customers not committing to pay water bills. The most important ones were low income with 20.5%, the bad quality of water with 25.2%, and bad municipality services with 17.9%. Based on these study findings, they recommended that the municipality of Khan Younis City in Palestine should make improvements in its service quality to enhance bill payments amongst consumers.

It is important to note that good financial performance in a water utility is quite important to achieve because it overlaps and ensures better performance in other aspects such as operation and maintenance and overall service delivery. Van Den Berg and Danilenko (2017) indicate that a negative cash flow in a utility shall lead to decreased service levels, postponing maintenance and payments to suppliers and/or if available, increase its dependence on government subsidies. Serious interventions are, therefore, pertinent to enable better performance, including raising water tariffs where necessary.

5.3 Customer service

5.3.1 Reliability

All Zomba WUAs in their course of service provision are at some point affected by reduced water levels at the source (rivers/wells) from where they abstract their water and feed into the distribution system. It was indicated during key informant interviews and focus group discussions that dry/hot months in the year, such as August, September, and October present such situations that call for frequent removal of silt at their intake and more water rationing than usual so that at least customers from different areas have access to water. It is again reported by Van Den Berg and

Danilenko (2017) that many utilities in Africa ration water, and that the smallest utilities provide the least hours of water supply while the largest utilities provide the most.

Pipe breakages and some maintenance works are also known to occasionally affect hours of supply to the water users. In occurrences where hours of water supply to consumers are abruptly reduced, the overall water accessibility around the coverage is affected. Preventive measures, therefore, need serious implementation, such as efficiency in water rationing, catchment preservation, storing more water in tanks where necessary and making sure that water losses are controlled as much as possible during the era.

Few WUAs provide water to most sections in their total targeted area while the majority supply to just some of the sections out of their designated sections. The limitation in such WUAs was reported to be due to the design capacity of the water supply scheme and the lack of financial capacity to do major maintenance works and extensions. WUA staff indicated that, currently, only some areas are suited for coverage regarding the same old design as some target areas are located at higher grounds where water is unable to flow with gravity. This, therefore, shows that some water users in the water supply scheme enjoy more water supply while some have limited supply or not at all. For other designated areas to have at least some water supplied to them and perhaps even more hours of water supply, there is a need for rehabilitation works (additional tanks/bigger pipes), which the WUAs are currently unable to finance for such works, worse still their struggle to handle basic operations and maintenance.

Apart from examining reliability in terms of hours of supply, some WUAs achieve partial reliability to the sections they are currently able to provide water. Even though, looking at the overall picture (dependent population), they are far from it considering the perspective of their

customers residing in sections where continuous water coverage is a problem (quote from a customer: *We just have these taps for show. Some water drips out for a short time after days. We source water from boreholes or from others who have water supply*). Mayaka and Zomba East WUAs achieve better water coverage even though Mayaka supplies water for 4 hours only a day.

The benchmark for hours of supply according to Tynan and Kingdom (2002) on hours of water service is 24 hours, and so is the global benchmark as indicated by Van den Berg and Danilenko (2017). However, from their study on the performance of utilities in Africa, they indicated that the African benchmark for the well-performing utilities is 21.6 hours. So far, most of the Zomba WUAs hit the benchmark seasonally and, for some, only for a certain coverage of their consumers.

In examining the role of WUAs in managing rural water supply schemes, it becomes evident that access challenges persist due to low coverage in the WUAs. While urban and peri-urban areas may receive attention and interventions aimed at extending water services, rural areas with decentralised management often remain entangled with the inability to rehabilitate and extend their water supply schemes. This disparity highlights the need for government intervention to ensure equitable access to water resources in all areas. As Adams and Zulu (2015) and Adams and Smiley (2018) emphasize, achieving the ambitious targets of the Sustainable Development Goals (SDGs) requires a nuanced approach that acknowledges the differing realities of urban, peri-urban, and rural areas. This calls for government intervention to accurately reflect local contexts and prioritising tangible progress over mere bureaucratic measures.

5.3.2 Affordability

Complaints on the cost of water exist in the WUAs and most of the WUAs receiving such complaints, already barely cover their operation and maintenance costs. It is rather on the contrary

that, increasing their tariffs would help them achieve a better financial performance. With reference to Table 3 in subsection 4.4.2, water prices are arguably fair considering that water bills are paid without taking into consideration the volume of water consumed, except for Mayaka WUA, which meters the water before conveyance. The communities/consumers need sensitization on the costs incurred to successfully convey water from the source so that they understand. This would improve the willingness to pay and perhaps make it easier to raise tariffs for WUAs, where this is a necessity.

It has been argued by Tynan and Kingdom (2002) that the affordability of water tariffs, in part, depends on the local conditions, such as family income, household consumption, and the number of consumers per connection. Additionally, a t-test analysis conducted by Van Den Berg and Danilenko (2017) on the performance of water utilities in Africa reveals that utilities with good financial performance tend to have lower levels of affordability. This trend was observed for Zomba East WUA, the only WUA to achieve the target ratio (>1) under financial performance, which also registers complaints from customers on water tariffs.

Findings from a study by Munzir et. al (2015) show that willingness to pay is significantly influenced by welfare, socio-economy, performance, price, and affordability to pay. A study by Abualtayef et al. (2019) on household's affordability and willingness to pay for water services in Palestine found that income, water distribution schedule, water quality, water quantity, municipality services, marital status, water network maintenance, water continuity, techniques in the municipality to deliver citizen's complaint satisfaction, staff response speed about the delivered complaint in the suitable time were determinants for household customer's willingness to pay. They further encourage an improvement in service quality to increase the consumers' willing ness to pay.

It is also claimed by Van Den Berg and Danilenko (2017) that cash flow and cost recovery are more complicated in smaller utilities than in larger utilities, such that smaller utilities typically charge higher water rates than larger utilities, and water in such utilities tends to be much less affordable than in larger utilities to be able to cover operation and maintenance costs. However, this is in contradiction with the case of the Southern Region Water Board (SRWB) and WUAs in Zomba. The water users comprehended that water from WUAs (which is a smaller utility) is cheaper than water tariffs of the SRWB. Nevertheless, the above argument might be true in circumstances where the WUAs adopt an efficient billing system. Currently, the WUA Water tariffs are paid by consumers monthly without considering the volume consumed during the period (refer to Table 3). The only WUA with meter coverage is Mayaka, whilst the Zomba East WUA only installs meters in institutional connections. Due to the lack of the metering system in most of the WUAs, it's a complex exercise to determine whether complaints on water tariffs are genuine or not.

5.3.3 Service Quality

5.3.3.1 Quality of water

Some of the WUAs are supplying poor-quality water. This has been observed due to a lack of treatment works in most of the WUAs and inconsistent chlorination of water before supplying it to customers in some WUAs. For some, there is no chlorination at all. However, a small proportion of consumers from such WUAs, especially those drinking from communal taps, enjoy the benefit of treated water through the installation of chlorine dispensers on the taps. This is facilitated by some health projects, as Figure 12 displays.

Figure 11: An installed chlorine dispensers through health projects

On the other hand, due to the absence of filters in these water supply schemes, water tends to come out turbid, especially, in the rainy season where there is more turbulence from the sources. This is a drawback to consumers as, in such instances, they must look for alternative/cleaner water for their home consumption. Consequently, this can undermine the responsibility of the WUA in the community, reduce the users' willingness to pay due to bad service which affects efficient revenue collection, and in the end poor maintenance resulting in the non-functionality of the schemes. This is corroborated by a report by Rijsdijk and Mkwambisi (2016) whose field studies on the sustainability of rural water points confirm the complexity of the issue. They rank interrelated causes of poor sustainability of the rural water points and poor water quality as one of them. Abualtayef et. al (2019), Munzir et. al (2015), and Mohanty and Rout (2023) do emphasize the

importance of providing services to the satisfaction of customers to enhance their collaboration, especially in paying water tariffs.

A defunct filter at the Zomba East water supply system is displayed in Figure. Other activities deteriorating the water quality include charcoal burning, cutting down of trees, and farming activities around their water sources which also calls for control measures. Interventions on installation of filters in the WUAs would help in addressing the water turbidity issue.

Figure 123: A defunct sand filter at Zomba East

In Malawi, the Malawi Bureau of Standards (MBS) provides guidelines for water quality and demands treatment of water for consumption to protect against bacteriological contamination. If

MBS were to certify for water, most of these schemes could not be permitted to supply water. A report by the Ministry of Water and Sanitation (2023) on the water quality of some of these WUAs, also confirms the presence of fecal contamination from some of the water points. Mayaka WUA was one of the sampled WUAs and it was the only one found to possess no fecal coliforms in all the sampled points. This might be because of consistency in chlorination.

. If it is a social responsibility of the government to supply rural communities with potable water, routine monitoring and treatment of water could be reinforced by implementing interventions, which would help the WUAs maintain good quality water for their consumers in the rural setup.

5.3.3.2 Customer responsiveness

WUAs being able to respond to complaints or queries when resources permit, gives the possibility that there might be other queries or complaints that heavily depend on the financial resources of the WUA. As such, if the resources are not available there might be an un-deliberate delayed response. An example of such a scenario might be a request for water coverage from a customer whose location requires heavy maintenance works or rehabilitation for possible conveyance of water. This might not be achievable instantly, hence little or no responsiveness of the WUAs to customers. Other than that, the required services, such as maintenance, new connections, and rendering requested information to their customers are being fulfilled. Response speed to consumer households by staff in water utilities is desirable as it contributes to their willingness to pay (Abualtayef et al. 2019).

5.3.3.3 Customer satisfaction

Complaints from customers about turbid water during the rainy season are an attribute of the unavailability of filters in the rural water supply schemes. Other than that, clear water is supplied

during other months. Alternative sources of drinking water, such as boreholes are an option to the water users when water is turbid. In such cases, water supplied by the WUAs is used for other domestic purposes other than drinking.

Similarly, from WUA personnel's perspective, customer responsiveness appears to be satisfactory. Most customers acknowledge prompt assistance during service interruptions. Despite the overall positive feedback, the Zomba West WUA had some concerns from customers regarding responsiveness, particularly on the time it took for installation of new water connections which, might be due to a lack of resources amongst other reasons.

The complaints on the reliability of some WUAs are in tandem with findings from the KIIs where it was established that only a few sections in the WUAs designated area of supply get to be supplied with water. Some lines in the distribution system occasionally have water running from their taps and some not at all. Reasons attributing to such situations include the need to upgrade and extend pipelines, tanks, and other necessities. Such activities require more funds which the WUAs cannot afford, especially, with their current financial performance.

Water tariffs were regarded to be affordable by most WUAs, except for a few reflected complaints in some WUAs. Some attributing reasons for such complaints include the community transitioning from the free water phase (old Kamuzu pipes) to contributing user fees. This underscore the complexity of addressing affordability concerns within water supply systems, particularly, during periods of transition or policy changes.

While overall, most of the customers expressed contentment with the services provided by the WUAs, it's noteworthy that a segment of respondents voiced dissatisfaction with Zomba West WUA. The concerns particularly highlight water availability and quality within the rural water

supply scheme. This is likely to be the case in all sections not very close to the main distribution pipeline including in other WUAs like Makhwawa North & South and Malosa because they have dry taps in some of the areas, they supply water to.

In a similar study by Abualtayef et al. (2019), results revealed that households were not satisfied with water network maintenance, municipality service, available techniques in municipality to deliver citizen's complaint, staff response speed about the delivered complaint in the suitable time and water quality. They consequently recommended an improvement in the quality of services to moderate the dissatisfaction levels as they affect consumers' contributions.

5.4 Operational performance of the WUAs

5.4.1 Non-revenue water management

The operational performance of utilities is often measured using nonrevenue water (NRW), thus high levels of UfW water may indicate poor system management and poor commercial practices as well as inadequate network maintenance as relayed by Ncube (2012). A target for UfW of 23% or less is recommended by Tynan and Kingdom (2002) based on the benchmark from their study on the performance of utilities in developing countries. This measure captures not only physical losses but also commercial losses due to inefficient billing and illegal connections. Unfortunately, it cannot be well determined in most of the WUAs in Zomba, except Mayaka WUA due to the unavailability of meters.

Costing of water use usually relies on meter readings and the system also allows customers to influence their water bills and provides water supply utilities with tools and information to allow them to better manage their systems. While determining the efficiency of operation and maintenance, parameters like metering, non-accounted-for water, and production vs. consumption

therefore require consideration. It would be a good initiative if the rural water supply schemes adopt a metering system to improve their efficiency in operations. The WUAs undoubtedly experience water losses (through breakages and illegal connections) and the staff reckons that they are regularly required to do maintenance works due to the old infrastructure, which is heavily susceptible to wearing and breakage, thereby contributing to water losses. They also use old materials in their maintenance work reducing the durability as displayed in Figure 14.

Figure 13: Maintenance using old materials.

It is also evident that a majority of the WUAs do not prepare for maintenance, but rather treat it as an emergency. A similar study in Ghana by Kumasi (2019) found that many repairs which relied on ‘fix upon failure’ were mostly delayed, often due to the time it takes to mobilise financial resources from ‘post-paid’ water users. The study contends that without an improved asset

maintenance system, it is likely that rural water systems in Ghana will continue to provide unsustainable services. The Findings demonstrate that improving the current asset management practices is dependent on human and financial resources, access to timely water service monitoring data at district levels, and planning and budgeting regimes to reflect life cycle costs of water systems.

The metered WUA has high operational costs as it does not use a gravity-fed system like the rest, they rather use electricity to operate pumps that draw water from boreholes to a storage tank. An analysis by Gill and Nema (2016) conducted in India confirms that the gravity-type schemes have better efficiency scores than those of lift-type utilities. This is perhaps one of the reasons it is strict in its billing mechanism as it charges per cubic meter. Another WUA (Zomba East) only meters its water supply towards institutional connections.

With the low level of the WUAs' financial performance, most of them are unable to do extensive maintenance work in trying to achieve a much better delivery of service to their consumers. A lack enough of resources to support their operations calls for government support to improve the state of these rural water supply schemes in Zomba District.

5.4.2 Staff efficiency

Efficiency in operations takes into consideration the lowest cost of inputs such as labour, energy, water and materials. Staff efficiency therefore entails the cost of labor input in the daily operation of a utility measured as a ratio of inputs to outputs. One such ratio that was adopted in the study was staff per 1000 connections. A high ratio may indicate inefficient use of staff. However, Tynan and Kingdom (2002) argue that the high ratios may also indicate that a single connection is serving several households, hence fewer connections overall. On the number of staff per connection, all

the WUAs in Zomba fall short of the target. This is possibly due to the above explained sentiment which is prevalent in the study area.

On the other hand, an alternative ratio of staff per 1000 served could have been used. This would eliminate the distortion caused when single connections serve multiple households as Tynan and Kingdom (2002) suggest. McKenzie and Ray (2009) also confirm this notion. Narrowing down to the Zomba WUAs, some keep good track of the total population they are serving while some do not, but rather the number of taps (including the non-functional ones). It was, therefore, a challenge to uniformly employ the rationale of staff per 1000 people served amongst the WUAs.

Then again, looking at the practicality of issues on the ground, despite not reaching the target on staff efficiency, the members of staff in these WUAs are struggling to achieve their objectives and perhaps need more staff to come to their aid. They even fail to hire more due to limited financial resources. Deducing from insights from the interviews and focus group discussions, most WUAs are characterized by a lack of resources and assets to help in maintenance works and to ease transportation around the coverage. (Quote from WUA staff: *'We walk long distances to attend to pipe breakages and clear siltation at the intake'*). The WUAs in such critical situations include Mayaka, Zomba West, Malosa, Makhwawa South, and Makhwawa North. Zomba East is far better because it has adequate resources for operations, including a vehicle for easy access to targeted areas. This is probably also why its staff efficiency is closer to the target than the rest.

5.5 Factors affecting the performance of the WUAs

5.5.1 Policies

Poor performance of the Zomba WUAs has also been partly due to some policies, the WUAs' legal framework, and institutional capacity. Some implementations of policies, governing rural water

supply projects do not give a very supportive environment for ensuring the sustainability of the water utilities. Regardless of decentralization, it was of most concern from the WUA staff that management of such rural water supply schemes is left entirely to the community. Through the focus group discussions held in the WUAs, propositions were made that the government should still support the shortcomings in the WUAs and that they should make sure that the WUA has achieved some level of independence while applying the decentralization concept.

Issues beneath the propositions include failure to generate enough financial resources for salaries for the secretariat, overlap of responsibilities due to few human resources attributed to inadequate income, and the inability to carry out bigger projects such as rehabilitation and extensions. It was also elaborated that volunteerism from the secretariat and board members in some schemes makes WUA sustainability hard. In such cases, a salary starter pack to the secretariat would be helpful.

On the other hand, the supply of water in Malawi is governed by the following legal and policy instruments: the National Water Resources Act (2013), the Water Works Act (1997), and the National Water Policy (2008). The supply of water in urban and peri-urban centres is done by water boards that are established by the Water Works Act. This Act establishes water utilities and sets up a framework within which they must operate. Looking at the institutionalization of the WUAs, it is noted that despite these institutions undertaking a water-related function as an extension of the Department of Water Supply and Sanitation (due to the decentralization concept), they are registered and regulated by the Trustees Incorporation Act. On the same note, findings of a report by the Ministry of Water and Sanitation (2023), arguably suggest that these institutions are by nature water utility institutions that must be established and regulated just as water boards. They further suggest that institutional arrangements for rural water supply need realignment for better oversight and support from the relevant authorities.

Additionally, findings by Jiménez Fernández de Palencia and Pérez-Foguet (2011), show that a mixture of policy incoherencies, technical shortcomings, and political influence determine that only a small proportion of funds reaches the underserved areas. They, therefore, argue for a greater connection between the bottom-up and top-down planning mechanisms, and a sharp increase of downwards accountability for better resource allocation and intervention from the central government.

5.5.2 Governance

Concerning the WUA constitution, some of the WUAs had no community involvement in the drafting process. This means that for some, constitutions were drafted for them and given to them to run the WUAs. This leads to problems in its enforcement and adherence. Legal instruments governing the WUAs need to be reviewed by the community before their use.

Regarding leadership structures, normally the WUA arrangement suffices for proper management of the schemes. The unavailability of some staff in the WUA secretariat and committees comprising the WUA also leads to poor scheme operations and management. Malosa WUA indicated that it has little support from local leaders, and it has had no board committee for over a year. There are also few staff in the secretariat, which is also the case in the other WUAs. These issues, therefore, in one way or another affect the performance of the rural water supply schemes in Zomba.

Study findings by Behailu et al. (2017) on service failures of rural water supply systems in Ethiopia and their policy implications indicate that lack of uniformity in the implementation approaches, and institutional and organizational incapability of the local government aggravate the service failures. They further indicate that capacity building, institutionalization, and improving

remuneration of employees are likely to reduce the problems substantially. This is in tandem with the report by the Ministry of Water and Sanitation (2023), which mentions gaps existing within the setup of WUAs, including governance factors.

5.5.3 Financial factors

The performance of many WUAs' in Zomba is hindered by financial issues. All the WUAs, except Zomba East WUA, had registered users' moderate to little willingness to pay for the water commodity and insufficient collection of revenue for operation and maintenance. The Zomba East WUA reported having few defaulters in revenue whilst collecting enough for operations.

Low WTP is not only due to prices being unaffordable. It is also infused with a lack of sensitization on what costs are incurred for the WUA to convey water from the intake to the consumers' taps. As earlier presented in Table 3, the water prices for Zomba WUAs show irregularities in their pricing mechanism, especially, in shared connections. Some households do not pay the service fee when they consume water from their nearest neighbor who has a tap. The pricing mechanism does not take into consideration the volume of water consumed, but rather the number of connections, except for Mayaka WUA, which is metered, and Zomba East WUA, which charges an additional fee on the connection for each additional household when a tap is shared.

The low WTP is also an effect of the tradition of water being regarded as a free commodity. This is experienced more in Makhwawa South WUA as indicated during the key informant interviews. The same has been observed in Nkhata Bay at Kavuzi WUA as indicated in the Ministry of Water and Sanitation (2023) report for a project, which aims at strengthening the WUAs and development of O&M strategy for rural water supply schemes in Malawi. The WUA in Nkhatabay is not in good shape as it relies on well-wishers to donate for its operations and maintenance, this is not commendable as there is no sustainability. Sufficient water tariffs are, therefore, an important

factor contributing to the better performance of these WUAs. Where need be, sensitization to the community on having reasonably adequate tariffs, must be carried out to ensure proper management and sustainability of the WUAs. The study, therefore, highlights the importance of understanding community perspectives and experiences in adapting to evolving service delivery models as well as the need for proactive communication and engagement strategies to manage expectations and mitigate potential sources of dissatisfaction in water pricing. While increasing the willingness to pay, the WUAs should also make sure that they are providing quality services. This is further confirmed by the findings of Abualtayef et al. (2019) in their study analysing households' affordability and willingness to pay for water services in Palestine.

As mentioned earlier, Jali WUA was dissolved in 2016. During the assessment, it was found that it had challenges in covering its operation and maintenance costs. They had metered connections just like in Mayaka WUA, including a similar scheme design comprising of pumps and boreholes. Such systems require more operational costs than gravity-fed systems. Once the financial performance is low, it is hard to sustain them. Jali WUA faced the challenge of pumps malfunctioning, which they temporarily fixed and could not replace due to their cost. Irregularities in supplying water thus kicked in, resultantly affecting revenue collection, and making operation and maintenance no longer viable. WUAs like Mayaka which use electricity in their operations, can benefit from subsidized electricity and more boreholes as they would, therefore, supply water for more than the daily rationed 4-hour period.

It is, therefore, why the financial performance of a utility is considered crucial because it has a direct link to its sustainability. The WUAs running in Zomba also need support, especially, at this instance where they seem to be struggling. They have little resources and fail to cover O&M costs, salaries, security of infrastructure etc. Proceeding at the same pace, the WUAs would be pictured

out of the equation as contributors to rural water supply. Zomba East WUA is the only one having a better financial performance (able to cover O&M), although it still expresses the need for external help to be able to do some major projects, which include extensions and rehabilitations since the schemes are generally old. Thus, aid is required to boost the performance of the WUAs so that they reach a level they can sustain themselves.

5.5.4 Management approaches

The WUAs wish for changes in the management approaches because they are left completely independent in handling both its basic and major operations and maintenance in the water supply scheme. They proposed that government financial assistance towards certain aspects of their scheme operations and management would be beneficial for their overall effectiveness and sustainability.

Further propositions from the WUAs include conducting refresher training for the secretariat and board members to fruitfully fulfill their roles and responsibilities. This is in tandem with the recommendation from the Malawi Sector Performance Report (2012) and the Malawi Appraisal Report (2014) that underscore that WUAs in Malawi need more resources and support and commends strengthening the capacity of the WUAs through developing WUA Federations so that they can share valuable lessons in managing their water services with other WUAs.

Mangum (2017), in his study on the sustainability of community-managed rural water supply systems in Amazonas, stipulates that despite the prevalence of community management models, there is a consensus that community management alone cannot ensure sustainable water services. Oates and Mwathunga (2018), in their report on the analysis of Malawi's rural water supply sector, highly recommend the need for post-construction support through various interventions to rural water supply schemes to enhance their sustainability.

There was emphasis from some WUAs on the need for design changes to supply water to more consumers. They also desired support, in terms of a salary starter pack, for its human resources as they barely cover operations and maintenance. Some WUAs do not have a Scheme Manager and therefore, the few WUA staff and Board members are the ones mostly doing the work of the WUA secretariat which is contrary to the WUA structural arrangement. The overall performance is affected by such situations in rural water supply schemes as there are no specified obligations for those supervising operations in the rural water scheme. The need for water meters to monitor water production and consumption in the rural water supply was also proposed as a better management approach due to inefficiencies tied to revenue collection and the billing process.

Undoubtedly, there is a need for interventions directed at performance improvement of the Zomba WUAs due to the status quo they are currently operating on. Despite Zomba East WUA having a better financial performance than the rest, all the WUAs need support from either the government or donor aid to achieve their full potential, especially, in terms of operational and financial performance. The most important requirements are the following: Rehabilitation works to widen water supply coverage, provision of water filters for good water quality, the metering system, and seed money.

5.5.5 The WUA systems

Documentation of inventories, operations, and all financial information are elements of good record keeping. They have relevance in tracking performance, planning, budgeting and aiding in decision making. Terrible record-keeping has been observed in a majority of the WUAs. Most of them are operating without detailed records of their operations and transactions. There are difficulties in keeping track of the exact figures as regards their expenses and income generated annually, and for some, figures without accuracy (guesses) were rendered during the assessment.

Ensuring accuracy in record-keeping processes within the WUAs is imperative for effective financial management and organizational governance. Studies show that organisations, which do not have a properly coordinated record management system, irrespective of the business sector, experience various challenges, such as delays in task completion, reduced service quality, failure to meet statutory requirements, and compromised document security, and these challenges lead to inconsistent cash flows (Msosa 2022).

Repercussions of poor record-keeping practices were evident during the assessment of the WUAs. Data unavailability hindered the evaluation of some performance indicators, including the total population served, non-revenue water (NRW), and financial inflows and outflows. The indicator of *WUA systems* as adopted for this study is embedded in the Group Maturity Index (GMI), which is used as a tool in performance assessment of entities of a similar nature, like the report of the Ministry of Water and Sanitation (2023).

It is, therefore, important for the Zomba WUAs to consider proper documentation of all WUA records, such as minutes, activity reports, and financial reports, and finally to regularly monitor, evaluate, and reflect progress and impact of their activities. This is significant because it will help the rural water supply schemes refine their operations.

5.5.6 Resources

In the GMI, there is also a section of resources and resources mobilization which looks at how much the utility owns as their assets, if they have enough resources for maintenance, and finally, if they have plans for the acquisition of assets for WUA operations (Ministry of Water and Sanitation 2023). The lack of resources for the operation and maintenance of the schemes has been widely noted in most of the WUAs in Zomba. They lack materials for maintenance, human resources, and assets for easy navigation around the community supplied with water and its intake.

This is tied to the financial constraints, which the WUAs have. With inadequate income, purchasing assets and materials for stewardship of the water supply scheme is a problem. Consequently, there is a lack of efficiency in operation and maintenance.

5.5.7 Scheme design capacity and infrastructure

A majority of the WUAs are running old gravity-fed water supply systems. Two major problems arise from the state of the scheme; firstly, as they were designed, they were meant to carter for a few people. Now with the increase in population, the water supply is inadequate, and extensions are necessary to have these WUAs supply a wider area. Factoring in the level of financial performance, the schemes need government or donor aid to be able to accomplish this activity for more coverage. Studies by Schweitzer and Mihelcic (2012) also corroborates the idea that post-construction support increases financial durability.

The second challenge with the state of the scheme is old infrastructure. The infrastructure results in water losses due to its frequent wearing and tearing. An increase in the NRW also, therefore, affects the operational performances of the WUAs. For Mayaka WUA, unlike the other WUAs, what is required are extra boreholes and storage tanks, which would enable it to supply water to more people and more hours other than the 4 hours/day.

In terms of the design, the WUAs having a gravity-fed water supply system indicated being impacted by the old infrastructure and the current population not being supplied with enough water as previous designs catered for a lower population.

5.5.8 Technological factors

It can be a challenge when the WUA secretariat does not have enough capacity to operate and maintain scheme infrastructures, both technically and intellectually as this would negatively affect

the overall performance of the scheme's operations. Sometimes, defects in operations are because of operators not being conversant with their systems design and difficulty in accessing spare parts for operations and maintenance. Musonda (2004), pointed out that the three factors that influence the sustainability of rural water supply from the technological point of view are; technology choice, availability of spare parts and operation and maintenance.

The study found that none of the Zomba WUAs had challenges pertaining to the highlighted issues under technological factors. The secretariat in all the WUAs is well conversant with their systems design and they have enough capacity in its operations. They also easily purchase most materials for maintenance from the district's town.

5.5.9 Social factors

Issues on communities taking part in making decisions and generally user involvement are prerequisites in running rural water supply schemes (Adams and Zulu 2015). Communities or customers have a right to access the information they require and hold the service providers accountable where necessary. At times, where this does not happen, the performance of such utilities can be affected. This is corroborated by Musonda (2004) who states that the lack of participation by rural communities which are the end users in the planning, implementation, and management of water supply facilities contributes to unsustainability. This takes into consideration the willingness to pay by consumers and various customer relations, which are necessary for the smooth running of these rural water supply schemes under WUAs.

Through the focus group discussions, key informant interviews, and customer surveys that were carried out, none of the WUAs had registered concerns about this factor. As such, there are no performance defects attached to this factor. This might also be the case due to the general WUA

setup, which comprises the board of trustees and general assembly members from each part of the community who oversee the conduct of the WUA secretariat on behalf of water users.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The study findings show that majority of the WUAs exhibited poor financial performance due to their present financial capacity and inefficiency in revenue collection, which consequently hinder smooth operation and maintenance. For better servicing of their customers, it is noted that the WUAs need rehabilitation works and extensions to improve water supply coverage as well as treatment of water for better quality. The response speed to registered complaints is satisfactory in most of the WUAs. Few of those complaints are attributed to a lack of resources, but overall, customers were satisfied with the general service delivery. The WUAs show poor operation performance with cases of non-revenue water, old infrastructure, and inefficiency of labor.

The study also found that the performance of the WUAs is affected by policies, governance, finances, management approaches, WUA systems (institution recording systems), lack of resources, scheme design capacity, and old infrastructure. Technological and social factors were not found to negatively affect the performance of WUAs in the study area.

In conclusion, efforts and interventions towards performance improvement of these WUAs in various indicators and observed gaps need to be implemented and monitored to enhance the sustainability of rural water supply. A highlight on mediations should also be imposed on the factors that have been identified to affect the performance of the WUAs so that they are counterweighed.

6.2 Recommendations

Based on the results and conclusions of this study, the following are the recommendations for interventions that need to be implemented for the better performance of the WUAs in Zomba and other districts.

- Redesigning of water tariffs to recover costs, and sensitization of people on costs incurred in service delivery to increase their willingness to pay.
- Implementation of interventions on consistent chlorination in the water supply schemes and installation of filtration systems for improved water quality.
- Continuous oversight and post-construction support from the government and development partners to WUAs in hefty projects, especially, extensions and rehabilitation of scheme infrastructure to improve water coverage. This highlights implementation of a joint management model under the WUA framework as it can later transition to autonomous management with only oversight from the government.
- Provision of training to WUA leaders for proper scheme management, including record keeping and having a complete leadership structure as per WUA design. Proper documentation will make future assessments easier and easy tracking of their own performance.

Further studies should be carried out to establish local benchmarks for frequent monitoring and evaluation by district staff and new design requirements of the rural water supply schemes to achieve more coverage at present and in the future.

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APPENDICES

Appendix 1: clearance certificate

MZUZU UNIVERSITY

DIRECTORATE OF RESEARCH

Mzuzu University
Private Bag 201
Luwinga
Mzuzu 2
MALAWI
TEL: 01 320 722
FAX: 01 320 648

MZUZU UNIVERSITY RESEARCH ETHICS COMMITTEE (MZUNIREC)

Ref No: MZUNIREC/DOR/22/92 **28/11/2022.**

Temwa Chilanga,
Mzuzu University,
P/Bag 201,
Luwinga,
Mzuzu 2.

temwachilanga@gmail.com

Dear Temwa,

RESEARCH ETHICS AND REGULATORY APPROVAL AND PERMIT FOR PROTOCOL REF NO: MZUNIREC/DOR/22/92: PERFORMANCE ANALYSIS OF ZOMBA WATER USERS ASSOCIATIONS IN RURAL WATER SUPPLY SCHEMES

Having satisfied all the relevant ethical and regulatory requirements, I am pleased to inform you that the above referred research protocol has officially been approved. You are now permitted to proceed with its implementation. Should there be any amendments to the approved protocol in the course of implementing it, you shall be required to seek approval of such amendments before implementation of the same.

This approval is valid for one year from the date of issuance of this approval. If the study goes beyond one year, an annual approval for continuation shall be required to be sought from the Mzuzu University Research Ethics Committee (MZUNIREC) in a format that is available at the Secretariat. Once the study is finalised, you are required to furnish the Committee with a final report of the study. The Committee reserves the right to carry out compliance inspection of this approved protocol at any time as may be deemed by it. As such, you are expected to properly maintain all study documents including consent forms.

Wishing you a successful implementation of your study.

Committee Address:
Secretariat, Mzuzu University Research Ethics Committee, P/Bag 201, Luwinga, Mzuzu 2; E-mail address: mzunirec@mzuni.ac.mw

Yours Sincerely,

Gift Mbwele

SENIOR RESEARCH ETHICS ADMINISTRATOR

For: CHAIRMAN OF MZUNIREC

MZUZU UNIVERSITY
RESEARCH ETHICS COMMITTEE
28 NOV 2022
PRIVATE BAG 201, LUWINGA
MZUZU 2

Committee Address:
Secretariat, Mzuzu University Research Ethics Committee, P/Bag 201, Luwinga, Mzuzu 2; E-mail address: mzunirec@mzuni.ac.mw

Appendix 2: consent form

Mzuzu University Research Ethics Committee (MZUNIREC)

Informed Consent Form for Research In

Performance Analysis of Zomba Water Users Associations

Introduction

I am **Temwa Chilanga** from **Mzuzu University**. We are doing research on **Performance Analysis of Zomba Water Users Associations in Rural Water Supply Schemes.** This consent form may contain words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask them of me or of another researcher.

Purpose of the research

This research aims to assess the performance status of the Water Users Associations governing rural water supply schemes in Zomba.

Type of Research Intervention

This research will involve your participation in a group discussion and/or individual interview.

Participant Selection

You are being invited to take part in this research because **you are a WUA customer/leader**.

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. If you choose not to participate nothing will change. You may skip any question and move on to the next question.

Duration

The research takes place for a period of **15 minutes**.

Risks

You do not have to answer any question or take part in the discussion/interview/survey if you feel the question(s) are too personal or if talking about them makes you uncomfortable.)

Reimbursements

You will not be provided any incentive to take part in the research.

Sharing the Results

The knowledge that we get from this research will be shared with you and your community before it is made widely available to the public. Following, we will publish the results so other interested people may learn from the research.

Who to Contact

If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact: Mr S. Matamula, Lecture, Mzuzu University, P/Bag 201, Luwinga, Mzuzu 2. Phone: 0888890390

This proposal has been reviewed and approved by Mzuzu University Research Ethics Committee (MZUNIREC) which is a committee whose task it is to make sure that research participants are protected from harm. If you wish to find about more about the Committee, contact Mr. Gift Mbwele, Mzuzu University Research Ethics (MZUNIREC) Administrator, Mzuzu University, P/Bag 201, Luwinga, Mzuzu 2, Phone: 0999404008/0888641486

Do you have any questions?

Part II: Certificate of Consent

I have been invited to participate in research about **Performance Analysis of Zomba Water Users Associations in Rural Water Supply Schemes**.

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study

Print Name of Participant_____

Signature of Participant _____

Date _____

Day/month/year

If illiterate [1]

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Print name of witness_____ **Thumb print of participant**

Signature of witness _____

Date _____

Day/month/year

[1] A literate witness must sign (if possible, this person should be selected by the participant and should have no connection to the research team). Participants who are illiterate should include their thumb print as well.

Statement by the researcher/person taking consent

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands the research project. I confirm the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

Signature of Researcher /person taking the consent_____

Date _____

Day/month/year

Appendix 3: Key Informants Interviews Checklist

KEY INFORMANT INTERVIEWS CHECKLIST FOR ZOMBA WUAs

Interviewer:

Name(s) of officer:

Title:

Date:

Section A: Financial performance

Working ratio

1. What are your total annual operating expenses versus the total annual revenue collections?

Collection efficiency

2. Do you manage to collect all the required revenue from your customers?

3. How long does it usually take to collect the monthly tariffs from your customers?

Section B: Customer Performance

Reliability

4. How many hours of water supply are your customers supplied with?

5. What is your approximate maximum period of water supply outage?

6. Are there any measures you put in place to achieve maximum hours of water supply?

Affordability

7. Do you get an increasing rate of new-connection applications?
8. Do you receive complaints on the tariffs from your customers? Quantify.
9. Are you planning on reducing your reinstated water tariffs?

Quality of service

10. Do you think you provide good quality water to your customers? Justify.
11. Are there any possible circumstances which deteriorate the WUA water quality? Are there any measures put in place?
12. How long does it usually take to address customer queries and complaints? Do you set some targets?

Section C: Operation Performance

Non-Revenue Water

13. Do you have cases of illegal water connections? Quantify.
14. How often do you get physical water losses from fittings, pipes etc.?
15. How fast do you address these challenges?
16. Do you have a way of at least quantifying water lost in the distribution system due to the above mentioned reasons? Do you have any reinstated measures to counter act such?

Staff Efficiency

17. How many staffs do you have? Do you plan to hire more?
18. How many people consume/use water supplied by the WUA?

Appendix 4: Focus Group Discussions guide

CHECKLIST FOR FGD ON FACTORS/ISSUES AFFECTING WUA PERFORMANCE

Date of FGD:

Name of WUA:

Number of customers:

Village:

Number of FGD Members:

POLICIES (Governance issues)

Policy context

1. Are the policies governing rural water supply projects clear and well implemented? Do they need reconstruction?
2. Do the policies give a supportive environment that ensures long-term sustainability?

Legal framework

3. Does the WUA have a constitution? If yes, how was it drafted?
4. What is the level of adherence to, and enforcement of the constitution?

Institutional capacity/framework

5. Is the leadership structure well organized?

6. Are the leaders able to partake their roles successfully?

7. Does the organizational structure has clear lines of responsibilities to the leaders?

SOCIAL FACTORS

8. Do the communities play a part in decision making?

9. Is there user involvement in the operation and maintenance of the water supply system?

10. Do the water users/community have access to information?

FINANCIAL/ ECONOMIC FACTORS

11. Are the water consumers willing to pay for the water bills?

12. Does the collected revenue suffice the WUAs operations and maintenances?

TECHNOLOGICAL FACTORS?

13. Do you have enough capacity in operating and maintaining the scheme structures?

14. Are you comfortable with the systems design?

15. Are spare parts readily available as required during operation and maintenance routines?

MANAGEMENT APPROACHES

16. Do you wish for changes in your WUA management system approach? If so, expound.

WATER RESOURCE SYSTEM

17. Do you face an abrupt decrease of available water from your source (river)?

18. At such times, how do you strategize?

19. Do you have measures in place to mitigate such situations when they occur?

20. Do you have any measures to preserve your catchment?

21. Overall, what other issues would you consider to make your water supply system sustainable?

Appendix 5: Customer survey questionnaire

SURVEY DETERMINING CUSTOMER PERFORMANCE IN ZOMBA WUAs

Interviewer: _____ Date: _____

Name of WUA: _____ Village: _____

QUESTIONS TO WUA CUSTOMERS

SECTION A: Household Characteristics

Gender of the respondent

- Male
- Female

Age of the respondent _____

Marital status of the respondent

- Single
- Married
- Divorced
- Widow/widower

Number of people in the household_____

Type of water connection

- Shared connection
- Private connection

Is your connection metered?

- Yes
- No

SECTION B: Reliability

On average, how many hours do you have water supply per day?

- 0-5
- 5-12
- 12-24

How much water do you collect per day? _____

How much water do you need per day? _____

In your perspective, does the WUA supply you with enough water as required?

- Yes
- Somewhat
- No

How reliable is the WUA in supplying you with water?

- Reliable

- Somewhat reliable
- Not reliable

If not, how do you cope up with such situations? _____

_____

What would you like the WUA to improve on in this case?

_____

SECTION C: Affordability

How much do you pay monthly as a water bill to the WUA? _____

Is it reasonable for you?

- Yes
- Somewhat
- No

Do you think the WUA should lower their tariffs in relation to their service?

- Yes
- No

How expensive is it to get access to a new connection?

- Not expensive
- Somewhat expensive

- Very expensive

Overall, water supplied by the WUA is affordable.

- Yes
- No
- Don’t know

SECTION D: Quality of service

Water Quality

The WUA provides good quality water.

- Yes
- No
- Sometimes

If no, do you use alternative water sources? _____

_____

The overall water quality supplied by the WUA is of good quality.

- Yes
- No
- Don’t know

Customer Responsiveness

It takes a long time for one to get a new household water connection.

- Yes
- Somewhat
- No

The WUA address queries and complaints timely.

- Yes
- Somewhat
- No

Customer Satisfaction

Overall, am satisfied with the WUAs service delivery.

- Yes
- No
- Don’t know

Appendix 6: Summarized data from the key informant interviews

WUA'S PERFORMANCE AGAINST BENCHMARKS

NAME OF WUA	**PERFORMANCE INDICATOR**	**VARIABLE**	**BENCHMARK/STANDARD PROTOCOL**	**WUAs PERFORMANCE**
ZOMBA WEST (Chingale)	Financial Performance	Working ratio	Total revenue collected annually: total annual expenditures ≥ 1	Ratio < 1 (1.8 M : 2.6 M)
		Fee collection period	(Reasonable time to be able to carry out scheme O&M costs)	Challenges in revenue collection. 2 weeks into the next month to collect some revenue proportion.
	Customer Performance	Reliability	24 hours water supply	24 hours in some sections except for breakages etc. some sections rarely have access, some not at all.
		Affordability	Ability of customers to afford water tariffs	No complaints on the tariff from customers, and there are tariff-increment plans. Increasing application rate for new tap connections.

		Quality of service	Water quality Customer responsiveness	Clean water than other groundwater sources. No application of chlorine. Quality compromised at times (rains, charcoal burning, agriculture). Addresses queries and complaints in time.
	Operational Performance	Non-Revenue water	Accounted for	No way of quantifying water lost in the distribution system. There are some cases of illegal connections. Maintenance is done after pipe breakage reports.
		Staff efficiency		There are 20 staffs (not less than 300 served), no plans to hire more staff
MALOSA	Financial Performance	Working ratio	Total revenue collected annually: total annual expenditures ≥ 1	Ratio < 1 (5M :?)

		Fee collection period	(Reasonable time to be able to carry out scheme O&M costs) < 3 months	Challenges in revenue collection. Most customers pay when threatened to cut off their water supply
	Customer Performance	Reliability	24 hours water supply	24 hours except during breakages, in some dry months (September-November) and some sections in higher grounds.
		Affordability	Ability of customers to afford water tariffs	No complaints on the tariff from customers, and there are tariff-increment plans. Increasing application rate for new tap connections.
		Quality of service	Water quality Customer responsiveness	They apply chlorine some times. Quality compromised at times (heavy rains, charcoal burning, agriculture). Addresses queries and complaints

				timely (except queries from areas not having access to water).
	Operational Performance	Non-Revenue water	Accounted for	No way of quantifying water lost in the distribution system. There are many cases of illegal connections. Maintenance is done after pipe breakage reports.
		Staff efficiency		There are 8 staffs (serving for about 947 taps), no plans to hire more staff due to limited finances.
ZOMBA EAST	Financial Performance	Working ratio	Total revenue collected annually: total annual expenditures ≥ 1	Ratio > 1 (53.9 M : 49.5 M)
		Fee collection period	(Reasonable time to be able to carry out scheme O&M costs)	70% of revenue collected within a month, which usually suffices required for O&M.
	Customer Performance	Reliability	24 hours water supply	24 hours. During the dry season, customers access

				water about 18 hours as water is rationed.
		Affordability	Ability of customers to afford water tariffs	A few complaints on the tariff from customers (2-3%). Increasing application rate for new tap connections.
		Quality of service	Water quality Customer responsiveness	Clean water passing through the filtration process and treated with chlorine. Quality compromised at times due to (heavy rains, vandalism, charcoal burning, and agriculture). Addresses queries and complaints in time.
	Operational Performance	Non-Revenue water	Accounted for	No way of quantifying water lost in the distribution system (old system with no back meter). There are some cases of illegal

				connections. Maintenance is done after pipe breakage reports.
		Staff efficiency		There are 18 staffs (about 339, 270 customers served), no plans to hire more staff
MAKHWAWA NORTH	Financial Performance	Working ratio	Total revenue collected annually: total annual expenditures ≥ 1	Ratio < 1 (1.4 M : ?)
		Fee collection period	(Reasonable time to be able to carry out scheme O&M costs)	Challenges in revenue collection. 2 weeks into the next month to collect some revenue proportion.
	Customer Performance	Reliability	24 hours water supply	24 hours in the first sections except for breakages etc. some sections in upper grounds rarely have access, some not at all.
		Affordability	Ability of customers to afford water tariffs	No complaints on the tariff from customers, and there are tariff-

				increment plans. Increasing application rate for new tap connections.
		Quality of service	Water quality Customer responsiveness	Clean water than other groundwater sources. Sometimes treated with chlorine. Quality compromised at times (rains, charcoal burning, agriculture). Addresses queries and complaints in time.
	Operational Performance	Non-Revenue water	Accounted for	No way of quantifying water lost in the distribution system. There are no cases of illegal connections rather theft and breakages of pipes. Maintenance is done after pipe breakage reports.
		Staff efficiency		There are 5 staffs (about 8000 customers served/

				264 taps), no plans to hire more staff
MAKHWAWA SOUTH	Financial Performance	Working ratio	Total revenue collected annually: total annual expenditures ≥ 1	Ratio < 1 (3 M :?)
		Fee collection period	(Reasonable time to be able to carry out scheme O&M costs)	Challenges in revenue collection (also attributed by dry taps). 2 weeks or more into the next month to collect some revenue proportion.
	Customer Performance	Reliability	24 hours water supply	24 hours in some sections except for breakages etc. and in some dry months (September-November). some sections rarely have access, some not at all.
		Affordability	Ability of customers to afford water tariffs	There are complaints on the tariff from some customers (especially due to the transition from free water). Increasing

				application rate for new tap connections.
		Quality of service	Water quality Customer responsiveness	No application of chlorine and filtration. Quality compromised at times (rains, breakage of pipes charcoal burning, agriculture). Addresses queries and complaints in time.
	Operational Performance	Non-Revenue water	Accounted for	No way of quantifying water lost in the distribution system. There are some cases of illegal connections. Maintenance is done after pipe breakage mainly attributed to old infrastructure. Sometimes maintenance takes longer since they have to source materials.
		Staff efficiency		There are 5 staffs (about 300 taps

				served), no plans to hire more staff due to limited financial resources.
MAYAKA	Financial Performance	Working ratio	Total revenue collected annually: total annual expenditures ≥ 1	Ratio < 1 (6.1 M : 7.6 M)
		Fee collection period	(Reasonable time to be able to carry out scheme O&M costs)	Challenges in revenue collection. 2-3 weeks into the next month to collect some revenue proportion.
	Customer Performance	Reliability	24 hours water supply	4 hours/day except for emergencies. Water rationing done when there is low yield from the wells (source)
		Affordability	Ability of customers to afford water tariffs	There are complaints on the tariff from customers, and there are no tariff-reduction plans. Increasing application rate for new tap connections.

		Quality of service	Water quality Customer responsiveness	Clean water treated with chlorine. Quality compromised at times (breakage of pipes). Addresses queries and complaints in time.
	Operational Performance	Non-Revenue water	Accounted for	Have a way of quantifying water lost in the distribution system. There are some cases of illegal connections especially meter tampering. Maintenance is done after pipe breakage reports.
		Staff efficiency		There are 6 staffs (202 customers), no plans to hire more staff

Appendix 7: Summarised data from the focus group discussions

FACTORS AFFECTING THE PERFORMANCE OF THE WUAs

NAME OF WUA	FACTOR	FINDINGS
Zomba West	Policy and governance issues	▪ Policies governing rural water supply projects do not give a supportive environment to ensure sustainability. Less support given from the government to WUAs. ▪ The WUA has a constitution, it was drafted by lawyers and there was no community involvement. Low levels of its adherence, because of little awareness and no civic education. ▪ Currently, the leadership structure is not well organized. Leaders lack proper training and there is no scheme manager/Local Utility Operator.
	Social factors	▪ `The communities play a part in decision making and there is user involvement in the O&M of the water supply system. The water users/community do have access to information.
	Financial/ Economic factors	▪ Water consumers are willing to pay for the water bills

		under normal circumstances (water mostly running from their taps), unlike when they experience dry taps. ▪ The collected revenue does not suffice for WUA's O&M.
	Technological and design factors	▪ There is enough capacity in operating and maintaining the scheme infrastructure. They are familiar with the scheme design and spare parts are readily available. ▪ In terms of design, the system need bigger pipes to be able to convey more water and ease access.
	Water resource system	▪ The WUA faces a decrease in water levels from the source in dry months (August-November). During these times they strategize by water rationing and daily removal of silt at the intake.
	WUA systems and resources	▪ The WUA has a poor financial recording system. They don't track their cash flow especially expenditure. ▪ The WUA do not have resources to help sustain their operation and maintenance works.

Malosa	Policy and governance issues	▪ The WUA does not have a challenge with policies governing rural water supply projects. ▪ The WUA has a constitution, it was drafted with community involvement. Low levels of its adherence, because of little awareness and no civic education. ▪ Currently, the leadership structure is not well organized. Leaders lack proper training and there is no scheme manager/Local Utility Operator.
	Social factors	▪ `The communities play a part in decision making and there is user involvement in the O&M of the water supply system. The water users/community do have access to information.
	Financial/ Economic factors	▪ Water consumers are not willing to pay for the water bills. Challenges in revenue collection. ▪ The collected revenue does not suffice for WUA's O&M.
	Technological and design factors	▪ There is enough capacity in operating and maintaining the scheme infrastructure.

		They are familiar with the scheme design and spare parts are readily available. ▪ In terms of design, the system need bigger pipes and tanks to be able to convey more water and supply areas with no access.
	Water resource system	▪ The WUA faces a decrease in water levels from the source in dry months (August-November). During these times they strategize by water rationing and daily removal of silt at the intake.
	WUA systems and resources	▪ The WUA has a poor financial recording system. They don't track their cash flow especially expenditure. ▪ The WUA do not have enough resources (some need maintenance) to help sustain their operation and maintenance works.
Zomba East	Policy and governance issues	▪ Policies governing rural water supply projects do not give a supportive environment to ensure sustainability. Less support given from the government to WUAs. District councils and local leaders should play a significant role in the water projects. The government

		should also be responsible for big/rehabilitation works in the WUAs. ▪ The WUA has a constitution, it was drafted with the involvement of the community. High levels of its adherence. ▪ Currently, the leadership structure well organized. With a few board committee members requiring training.
	Social factors	▪ `The communities play a part in decision making and there is user involvement in the O&M of the water supply system. The water users/community do have access to information.
	Financial/ Economic factors	▪ Water consumers are willing to pay for the water bills with a few defaulters. ▪ The collected revenue suffice for WUA's O&M but not extensions and rehabilitation.
	Technological and design factors	▪ There is enough capacity in operating and maintaining the scheme infrastructure. They are familiar with the scheme design and spare parts are readily available.

		▪ In terms of design, the system is old with improper filter design, tanks requiring bleeding (to avoid airlocks) and no back meter.
	Water resource system	▪ The WUA faces a decrease in water levels from the source in dry months (August-November). During these times they strategize by water rationing.
	WUA systems and resources	▪ The WUA has a good recording system e.g. financial and asset inventory records. The WUA has enough resources to help sustain operation and maintenance works.
Makhwawa North	Policy and governance issues	▪ Policies governing rural water supply projects do not give a supportive environment to ensure sustainability. Less support given from the government to WUAs. The volunteerism of the board of trustees and General assembly makes sustainability hard. ▪ The WUA has a constitution, it was drafted by lawyers with community involvement. Mostly staff personnel aware of it unlike customers.

		▪ Currently, the leadership structure is well organized. More human resource required for sustenance.
	Social factors	▪ `The communities play a part in decision making and there is user involvement in the O&M of the water supply system. The water users/community do have access to information.
	Financial/ Economic factors	▪ Water consumers are willing to pay for the water bills with a few defaulters. ▪ The collected revenue does not suffice for WUA's O&M.
	Technological and design factors	▪ There is enough capacity in operating and maintaining the scheme infrastructure. They are familiar with the scheme design and spare parts are readily available. ▪ In terms of design, the system need bigger pipes and extra tanks to boost its operations and be able to convey more water and ease access.
	Water resource system	▪ The WUA faces a decrease in water levels from the source in dry months

		(September-November). During these times they strategize by water rationing.
	WUA systems and resources	▪ The WUA has a poor financial recording system. They don't track their cash flow especially expenditure. ▪ The WUA do not have enough resources to help sustain their operation and maintenance works.
Makhwawa South	Policy and governance issues	▪ Policies governing rural water supply projects do not give a supportive environment to ensure sustainability. Less support given from the government to WUAs. The government should make sure WUAs are fully independent before letting them run on their own. ▪ The WUA has a constitution, it was drafted by lawyers and there was no community involvement. Low levels of its adherence. ▪ Currently, the leadership structure is well organized. Even though, proper training required to improve on management.

	Social factors	▪ `The communities play a part in decision making and there is user involvement in the O&M of the water supply system. The water users/community do have access to information.
	Financial/ Economic factors	▪ Some water consumers are willing to pay for the water bills under normal circumstances (water mostly running from their taps), unlike when they experience dry taps. Some water users are also reluctant since they were used to the previously free water before the transition. ▪ The collected revenue does not suffice for WUA's O&M.
	Technological and design factors	▪ There is enough capacity in operating and maintaining the scheme infrastructure. They are familiar with the scheme design and spare parts are readily available. ▪ In terms of design, the system need bigger pipes and tanks to be able to convey more water and ease access in other areas. It also need gate valves so that they are able to ration the water.

	Water resource system	▪ The WUA faces a decrease in water levels from the source in dry months (September-November). During these times they advise customers to use water for normal activities (not for heavy uses).
	WUA systems and resources	▪ The WUA has a poor financial recording system. They don't track their cash flow, especially expenditure. ▪ The WUA do not have enough resources to help sustain their operation and maintenance works.
Mayaka	Policy and governance issues	▪ Policies governing rural water supply projects do not give a supportive environment to ensure sustainability. Less support given from the government to WUAs. ▪ The staff were not sure if the WUA had a constitution. ▪ Currently, the leadership structure is well organized. More human resource required for sustenance.
	Social factors	▪ `The communities play a part in decision making and there is user involvement in the O&M of the water

		supply system. The water users/community do have access to information.
	Financial/ Economic factors	▪ Not many water consumers are willing to pay for the water bills. ▪ The collected revenue does not suffice for WUA's O&M.
	Technological and design factors	▪ There is enough capacity in operating and maintaining the scheme infrastructure. They are familiar with the scheme design and spare parts are readily available. ▪ In terms of design, the system need an extra borehole and tanks to be able to convey more water and increase access hours.
	Water resource system	▪ The WUA faces a decrease in water levels from the source in dry months (August-November). During these times they strategize by water rationing.
	WUA systems and resources	▪ The WUA has a good recording system e.g. financial and asset inventory records. ▪ The WUA do not have enough resources to help

		sustain their operation and maintenance works.
Jali (Dissolved WUA)	Policy and governance issues	▪ Did not quite have a challenge with policies governing rural water supply projects. Nevertheless no much support given from the government to the WUA. ▪ The WUA had a constitution, and it was being adhered to ▪ The leadership structure was well organized and they knew their roles and responsibilities.
	Social factors	▪ `The communities took part in decision making and there was user involvement in the O&M of the water supply system. The water users/community had access to information.
	Financial/ Economic factors	▪ Water consumers were willing to pay for the water bills. ▪ The collected revenue did not suffice for WUA's O&M.
	Technological and design factors	▪ There had enough capacity in operating and maintaining the scheme infrastructure. They were familiar with the

		scheme design and spare parts were readily available. ▪ In terms of design, the system need bigger pipes to be able to convey more water and ease access.
	Water resource system	▪ The WUA faced a decrease in water levels from the boreholes in dry months (October -November). This contributed to frequent malfunctioning of pumps. During these times they strategized by water rationing.
	WUA systems and resources	▪ The WUA had a good financial recording system. ▪ The WUA did not have enough resources to help sustain their operation and maintenance works. Worse still the revenue collected was not enough and the pumps frequently malfunctioned with need of replacement.