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INSTITUTIONAL ARRANGEMENTS, ACTORS AND OUTCOMES IN COMMUNITY-BASED MANAGEMENT MODEL OF DRINKING WATER SUPPLY SYSTEMS IN RURAL GHANA: A CASE STUDY OF NADOWLI-KALEO DISTRICT

STEPHEN YIR-ERU ENGMEN

(10637972)

THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON, IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF DOCTOR OF PHILOSOPHY IN DEVELOPMENT STUDIES DEGREE

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DECLARATION

I, Stephen Yir-eru Engmen, do hereby declare that except for references cited, which have been duly acknowledged, this work, **'Institutional Arrangements, Actors and Outcomes in Community-Based Management Model of Drinking Water Supply in Rural Ghana: A Case Study of Nadowli-Kaleo District'**, is the result of my own research. It has never been presented anywhere, either in part or in whole for the award of any degree.

SIGNATURE.....

DATE....29-10-2023.....

Stephen Yir-eru Engmen

We, the undersigned supervisors, certify that this is an original work we supervised the candidate to produce. We are convinced the thesis meets all required standards set by the University of Ghana for an award of a Doctor of Philosophy degree.

SIGNATURE.....

DATE.....30/10/2023.....

Prof. George Owusu

(LEAD SUPERVISOR)

SIGNATURE.....

DATE.....31-10-2023.....

Prof. Samuel Nii Ardey Codjoe

(CO - SUPERVISOR)

SIGNATURE.....

DATE.....31-10-2023.....

Prof Gerald A. B Yiran

(CO - SUPERVISOR)

ABSTRACT

Despite efforts to deliver community-based water systems to increase access to potable water, there remain challenges in the institutional management systems of interventions to sustain such initiatives in the Nadowli-Kaleo District (NKD). The study employed a mixed method approach (i.e., quantitative, and qualitative) field surveys, semi-structured questionnaire, and structured questionnaire for a sample size of 345 household heads/spouses selected from 28 communities, as well as interviews, desktop review, and focal group discussion in data gathering to examine outcomes in the implementation of CBM water supply system in the Nadowli-Kaleo District Assembly area. The results showed that respondents from Damba, Takyiripei, Banouri and Koboguyiri, Jang, Vogooni, and Goli Dawaayiri found monetary contribution towards major operations/maintenance and minor maintenance/repairs of their boreholes as the key challenging issues. On the other hand, those from Yiziri, Niiri, and Kpazie Muglu indicated inadequate in-service training in post-construction support services delivery of potable water as their major challenge. These factors jointly accounted for 58.7 percent variances in respondents' views about factors militating against the realization of outcomes of the CBM Model of services for rural water supply sustainability. Correlations between predictive militating factors showed that monetary contribution towards major operations and or maintenance of boreholes were significant at p <0.006), sensitization and minor maintenance of boreholes at $P < 0.005$, minor maintenance of boreholes and sacrifice for lower deities at $P < 0.0009$, influence post construction services setbacks. The study recommends that rural water sector institutions and actors should strengthen community capacity to handle operational and maintenance costs of boreholes to sustain the demand-driven approach in rural communities. It also recommends that a framework of donor coordination in the rural water sector aimed at improving the water use behavior of users and local borehole repairers', as well as transparency and accountability by water committee members in the disbursement of funds be strengthened to sustain the CBM model in the rural water supply sector.

DEDICATION

My parents Peter Tink Engmen Puodong and Aayin Billeh.

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LIST OF ABBREVIATIONS

BOO	Build, Own and Operate
BOT	Build Operate and Transfer
CBM	Community-Based Management
CBOs	Community-Based Organisations
CLTS	Community-Led Total Sanitation
CP	Community Participation
COM	Community Ownership and Management
CSOs	Civil Society Organisations
CWSA	Community Water and Sanitation Agency
DANIDA	Danish International Development Agency
DDA	Demand-Driven Approach
DWSTs	District Water and Sanitation Teams
EHA	Environmental Health Assistant
ESA	External Support Agency
GSS	Ghana Statistical Service

GWCL	Ghana Water Company Limited
GWSC	Ghana Water and Sewerage Corporation
IDA	International Development Association
IDWSSD	International Drinking Water Supply and Sanitation Decade
MMDA	Metropolitan, Municipal, and District Assembly
MMDCE	Metropolitan, Municipal, and District Chief Executive
MLGDRD	Ministry of Local Government, Decentralisation and Rural Development
MOM	Monitoring of Operations and Maintenance
NCWSP	National Community Water and Sanitation Programme
NCWSS	National Community Water and Sanitation Strategy
NKDA	Nadowli Kaleo District Assembly
OECD	Organisation of Economic Cooperation and Development
PCS	Post Construction Support

PPP	Public- Private Partnership
PPCP	Public-Private Community Participation
RCC	Regional Coordinating Council
ROT	Rehabilitate, Operate, and Transfer
RWSS	Rural Water Supply and Sanitation
SRWS	Sustainable Rural Water Services
UNDP	United Nations Development Programme
UNICEF	United Nations International Children Emergency Fund
USAID	United States Agency for International Development
WRC	Water Resources Commission

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

It is estimated by the United Nations that about 40% of the world's population lacks access to essential services such as clean, potable, and affordable drinking water and washing of hands with soap (UNICEF/WHO, 2021). These statistics are corroborated by the United Nations International Children Emergency Fund figures, which estimated that 30% of the world's population lacks access to safe drinking water (Atangana & Oberholster, 2022; Malik et al., 2016).

In response to global safe water scarcity, deliberate efforts continue to be made by international organisations over many decades to provide solutions through various policies. For example, the UN Drinking Water Supply and Sanitation Decade implored governments to providedrinking water mainly as a social good; Millennium Development Goal Target 7c; and SustainableDevelopment Goal 6, all focused on promoting access to safe water, especially for low-income groups (Galaa and Bukari, 2014). The new strategy of the international development community to overcome the burden of access to safe drinking water is hinged on Community Participation (CP) among service users. Community participation is the involvement of people in community development projects (Ananga, 2015). It brings together people with shared needs living in a particular area to pursue a common goal, and decisions and start the mechanisms to meet their common goal/needs. It is the process through which communities initiate their project, empower,motivate, decide, mobilise, and implement projects themselves (Fields, 2003; Marks et al., 2014).

The attributes of community participation are community involvement in project planning, project implementation, operation, and maintenance (O&M), sharing of project benefits, project

evaluation, feedback, and review (Riswan, 2021). The new specific form of community participation of interest to the international community is the Community-Based Management (CBM) model. The Community-Based Management (CBM) has been promoted as a sustainable alternative for governing common pool resources, including water and fisheries among others, and characterized by local users' understanding, the incentive to manage their resources and the transfer of management authority to the lowest appropriate level, for sustainability. In the water sector, this finds typical expression in the daman-driven approach (DDA), in which access to water is no longer treated as a basic need supplied by governments free of charge, but through the expressed demand of the water users (Moriarty et al., 2013). Here, water is treated as an economic good, characterized by payment for service extensions and tariff imposition (Bukari, 2017).

There has been extensive literature on the potential benefits of community ownership and management of water systems with the application of the CBM model. Some scholars have accepted figures on the potential benefits of the model without challenge. Little is known about the disadvantages and challenges of community ownership and management of water supply systems. Figures are sometimes used to demonstrate successes without taking into consideration their context and jurisdiction (Kativhu et al., 2022; Machado et al., 2019; Madrigal-ballestero et al., 2013). There are critics of the CBM model who contend that its origin with neoliberal doctrine of private sector involvement is alien and without any evidence to back the call to scale up its application (Benjamin & Kwashie, 2009; Fielmua, 2011; Fobih, 2020; Hall, 2015; Hove et al., 2019; Komives et al., 2008; Kumasi & Agbemor, 2018; Nsubuga et al., 2014). This study is aimed at scrutinizing the implementation of the CBM water management system and the factors that affect its sustainability in rural water supply projects.

1.1.1 Demand-Driven Community-Based Management (CBM) of Water Systems

In the 1980s many rural water programs were performing poorly, and water systems were breaking down frequently (Chaudhuri et al., 2020; Senbeta & Shu, 2019). Regardless of the type of technology utilized, systems were not being repaired and were falling into disuse. Cost recovery was minimal, and revenues were often insufficient to pay for even operation and maintenance, with much fewer capital costs. Communities did not have a sense of ownership in their water projects, and households were not satisfied with the projects that donors and national governments installed. These programs defined the supply-driven approach, characteristically top-down by nature, and the undemocratic process of selection of water delivery systems. In other words, beneficiaries were not involved in the processes.

In the 1990s, a global affirmative action to make rural water programs and water systems work adopted the demand-driven approach for Community-Based Management of Water and Sanitation Systems. In a study into outcomes in rural water supply systems in Latin America, the successes of the demand-driven approach were influenced by community participation in the choice of technology, tariff regime, operations, management arrangements, and general project implementation. Such participatory approaches were accepted to improve community ownership of projects and lead to their strong sustainability and without further post-construction support (PCS) (Becker et al., 2015; Borja-Vega et al., 2017; Tantoh & Simatele, 2018). This study sought to fill this literature gap by addressing the first research, which centres on the demand-driven approach.

1.1.2 Mar Del Plata Conference Declaration

Drought is a major reason why irrigation systems cannot be constructed to support food production in temperate regions of the world where there is famine. In climate regions that are found in tropical and sub-tropical areas in Africa, climate change became topical in the mid-1970s because of desertification that caused food shortages and unavailability of clean drinking water. The Mar Del Plata platform recognised the need for safe water supply to be all-inclusive for the poor in what it termed "Some for all rather than more for some recommendation."

In 1977, the United Nations called its first intergovernmental conference to dialogue on the way out to ensuring an adequate supply of water in the future and to avoid a water crisis in the future. Ten resolutions were made at the end of the conference. One of these resolutions focused on community water supply to all people. The United Nations Conference on Human Settlement resolved that "all people, whatever their stage of development and their social and economic conditions, have the right to have access to drinking water in quantities and of a quality equal to their basic needs" (Sayato, 1989). The Mar Del Plata UN conference also recommended that participating countries include national development policies and strategies to prioritise drinking water supply availability to all populations by 1990. It also recommended that governments of signatory countries should encourage and support efforts undertaken by local voluntary organisational teams and provide local initiatives to make water available in realistic quality and quantity in both urban and rural communities. Institutional human resumes strengthenadequate resource allocation.

The action plan of the conferences was to resolve constraints concerning inadequate human resources at the lower and intermediate levels of each member country. Member countries were

encouraged to implement new approaches targeted at motivating communities to get involved at all levels of programme implementation, including the "planning, construction, operation, maintenance, and financing of services and the monitoring and safeguarding of the quality of the water supplied" (WHO et al., 1990). The conference concluded with a recommendation for action through informational cooperation for increased capacities to facilitate community water supply and sanitation, prioritise projects and programmes in community water supply and sanitation, increase collaboration with the World Health Organisation (WHO) for monitoring and reporting, improve professional training at the community level and increase community participation all levels of water and sanitation supply and services.

1.1.3 International Drinking Water Supply and Sanitation Decade 1981–1990

One of the main goals of the International Drinking Water Supply and Sanitation Decade (IDWSSD) instituted between 1981–1990 was to ensure that clean water supply and sanitation services were made available to all. This was expected to improve health outcomes and generally increase productivity. The main objective was to "provide all people with water of safe quality in adequate quantity and basic sanitation facilities by 1990. If possible, according to priority to the poor and less privileged" (N. B. Salom, 2020). The IDWSSD approach was different, as it directed its efforts towards using water and sanitation development as a primary health care issue in under-served urban and rural areas. Policies and programmes are to be implemented under a proposed approach of self-reliant, self-sustaining, and all sector participating that will ensure that be "community-based manpower community workers must be provided with information and logistic and operational support from the appropriate government services." (Chisenga, 2014). In brief, the decade's implementation of reforms focused on community participation, community management, community financing, privatization, and the use of appropriate technology.

Community management as a new paradigm in the 1990s intended to "empower and equip communities to own and control their own system" (Solomon-Ayeh & Asare Osei, 2012), involving the sole responsibility in decision-making, active participation, and taking ownership of water and sanitation supply, services and facilities. In the IDWSSD vision, there was both a philosophical and ideological change in the approach to water and sanitation supply and services under the community management paradigm. The proposed community management model envisaged a "Changing role for governments, from that of provider to that of a promoter and facilitator, enabling local, public, private, and community institutions to deliver services, whereby community ownership became the driving force and incentive for water and sanitation services care, operation maintenance and participation".

1.1.4 New Delhi Consultation, 1990.

Deprived people living in developing countries suffer from diseases and deaths that are attributable to the lack of safe drinking water supplies and poor environmental sanitationservices. Participating countries in the International Drinking Water Supply and Sanitation Decade (19981-1996) learned lessons after a thorough evaluation of this decade the global community accepted the call for commitment towards the need to recognise water and sanitation supplies as not only a technological challenge but a social and economic desirability to use appropriate technologies, adoption of the community management model and community participation in pre-project and post-project implementation. However, the water and sanitation decade were plagued with challenges ranging from population growth in cities that overstretched available water infrastructure, depletion of water resources, weak institutions, and lesser funding for investment. The major guiding principles in the New Delhi Consultation Forum were focused

on protecting the environment, integrated management of water resources, liquid and solid wastes, full participation of women at all levels of institutions, and "community management of services which was backed by concrete measures to strengthen local actors and institutions to implement and sustain water and sanitation programmes within their own localities. This sustained financial practice ensured better management of assets with the use of the appropriate technological innovation. The principle of community management was aimed at not a mere involvement of communities in decision-making but intended to empower communities to own and control their own local resources aimed at sustaining water systems in the long run.

In addition, community ownership and community management principles are also recommended for plan action support CM through "legislation and extension" in all national sectors strategic planning and implementation. In addition, community ownership and community management principles are also recommended for plan action support CM through "legislation and extension" in all national sectors strategic planning and implementation. All programmes were responsive to community needs and desire through participation monitoring and evaluation of water and sanitation supply systems.

1.1.5 Mole Conferences Series on Water and Sanitation.

The Mole Conference Series is an umbrella multi-stakeholder annual gathering of the WASH sector in Ghana since 1989. Mole Conferences, policymakers, civil-society organization, local government authorities, academia, non-governmental organizations, media, and the private sector meet to deliberate on critical themes and share knowledge on the WASH sector. A recent discussion on WASH was on the linkages between governance, accountability, and the effectiveness of aid towards the sustainability of water services. In the early 1990s, the Mole Conference Series set out an objective to:

Service as a clearing house for information and in intelligence generation and exchange on issues of programming, policy formulation and implementation process on water, sanitation, and hygiene practices at local and national levels to:

serve as a lobby for greater NGO participation in national and international policy-making at an early state; and

serve as a platform for engaging the media; and Engage NGOs in dialogue with one another within and across the section".

In 1992, the Mole Conference Series adopted the theme: "Transition to Community- Managed Water Systems – the challenge to the NGO". This was in response to a shift in policy, as the National Rural Water Strategy (NRWS) devolved the role of Ghana Water and Sewerage Corporation (GWSC) as a promoter and facilitator of water and sanitation supply. The discussion at this forum focused on the new role of the private sector, the transition process, training, spare parts, and operation and maintenance processes. The birth of the Coalition of NGOs in Water and Sanitation in the 2003 Mole Conference further enhanced the partnership role of NGOs in making water and sanitation available to the deprived. The Mole Conference Series has succeeded in doing much advocacy and influencing government policy on rural water supply and sanitation services (CONIWAS Secretariat, March, 2014). It is important to note that discussions at the Mole Conference series on water and sanitation in Northern Ghana were favourable to contribute to positive outcomes. The 1974 report on outcomes of the implemented Upper Region Water Survey Project (URWSP) by the Canadian International Development Agency (CIDA) and the Ghana Water and Sewerage Cooperation (GWSC) revealed the importance of community participation in the water supply to inhabitants in districts except for the lack of incentives to actively participate during the rainy season when their labour was required in the farms for food cultivation although

the project "improved access to a safe water source" in the Sissala district (Kendie, 1992). Dialogues in rural water and sanitation supply are indeed not only limited to NGOs but alsopeople in academia.

1.1.6 Water Supply Sustainability and the Sustainable Development Goals

The UN Member States proposed the Sustainable Development Goals (SDGs) to succeed the Millennium Development Goals (MDGs) for the period between 2015-2030. These SDGs are a network of goals and targets that are interconnected in several ways. The development of these goals is seen as a challenge not only for developing countries but as universal as there are implications for the global community. The SDG 6 is aimed at making clean water and sanitation available to all by 2030. It is estimated that 2.5 billion people globally lack access to basic improved sanitation, and over 780 million do not have access to improved drinking water (WHO, 2012). The Millennium Development Goals (MDGs) noted the importance of water and sanitation in Goal 7c and target to halve the proportion of the world population without sustainable access to safe, improved drinking water and basic sanitation by 2030.

1.2 Problem Statement of the Study

Sustainability in water delivery is the determination whether WASH services and good hygiene practices continue to work and deliver benefits over time. There are no time limits set on these continued services, behaviour changes, and outcomes. In other words, sustainability is about lasting benefits achieved through the continued enjoyment of water supply and sanitation services and hygiene practices for a longer period and to the benefit of many people. This definition is closely linked to the ability of water supply managers to provide efficient services that lead to good public health standards, welfare, and effective management that will not negatively affect the environment. To (Aslam et al., 2016) sees a sustainable water supply system as one that is "capable

of delivering safe and sufficient drinking water, based on the participation of stakeholders" with the capacity not to contaminate the environmental source of that water, technically regulate and maintain the water source infrastructure, design a system to locally raise the required economic resources for operation, promote socially equitable access to the drinking water and a designed institutional support for effective community management system. This entails a long-term management responsibility that has environmental, economic, and social effects and dimensions. In (Riswan, 2021) there are three driving mechanisms of sustainability of drinking water supply. The first is the motivation for end-users to fully participate in the pre-construction and post-construction phases of water projects. The second is the capacity of end-users to have theskills for the maintenance of water infrastructure. The third mechanism is the ability and willingness of water users to effectively and substantially make financial contributions towards cost recovery during times of water facility breakdown. The last is the continuous flow of externalsupport to communities and beneficiaries to maintain the water infrastructure.

The Nadowli-Kaleo district has both improved and unimproved sources of water, depending on the reason. Water users sometimes search for water from their own communities by moving to other communities to draw water. These movements caused delays, congestion, and longer time spent at the source point to obtain water (Fielmua, 2011). The NKD still has communities without portable drinking water as a result of some wells drying up. These are a result of drilling machines' inability to hit water due to hydrological challenges. There is a need to replace obsolete hand pump facilities in the NKD to enable it to meet the SDGs by 2030. Some households travel an average of 1.4 kilometers to access water (Fielmua, 2020). This is three times farther than the approved distance of a minimum of 500 meters. The NKD has to access spare parts from other regions because of their unavailability within the Upper West region and even when spare parts are

available, the ability to access area mechanics becomes a challenge becauseof outmigration (Braimah et al., 2016). Local managers of water facilities in this district have high transaction costs in maintaining broken-down boreholes. The shortage of water supply in rural areas (Borisova et al., 2020) is a result of growing reports of unsustainable rural water projects, largely as a result of poor maintenance of infrastructure and poor financial viability at the end-user level (Cleaver et al., 2005; Kumasi, 2018; Nyarko, 2010). The phenomenon of unsustainable management of rural water infrastructure is more evidenced in Sub-Saharan African countries (Boulenouar, 2014), and Ghana is no exception (Bazaanah, 2019; Oduro-kwarteng et al.,2014), especially in the Nadowli-Kaleo District (the study area and one of the poorest districts in the country).

The paradigm shifts to the CBM model of sustainable management of rural water supply systems in the mid-1990s recommended the involvement of local community members in the design through to the implementation stage. Nonetheless, the CBM model continued to be unsustainable (Kativhu et al., 2018; Mugumya & Doyle, 2013) in reality and did not ensure a continuous flow of water to beneficiaries. There has since been growing attention from governments, NGOs, international development agencies, and academia for increased donor support to the rural water supply sub-sector. (CONIWAS Secretariat, March 2014).

In recent times, studies on sustainable rural water supply, particularly across Sub-Saharan Africa, are varied and largely focused on physicochemical properties of water quality (Karikari & Ansa-Asare, 2009; Nkansah et al., 2011) biological water quality properties in water pollution from illegal artisanal mining (Agyenim, 2011; Frimpong et al., 2021; USAID, 2015), water governance (Nsubuga et al., 2014), water use (Yeleliere et al., 2018) and traditional conservationmethods (known as local knowledge in conservation) (Kwoyiga & Stefan, 2018).

The construction of handpump wells in the Nadowli-Kaleo district increased by 40% in 2020. There was, however, an "increased number of broken-down boreholes and others that require rehabilitation" to support a continuous supply of clean water to end-users. Available records show that eight (8) communities are yet to benefit from any potable source of drinking water and 48% of the population as shown the Composite Budget of the Nadowli-Kaleo District Assembly from 2023-2026. The district has no access to sanitation facilities and as such still practice Open Defecation Free (ODF) in their communities (Abanyie et al., 2020). The ownership and management of water facilities in the NK district are influenced by attitudes towards management and the reason for a high breakdown of boreholes (Braimah et al., 2016).

The SRWSP was well structured along the CBM model with community participation in the pre-construction and post-construction phases within the framework of a decentralized stakeholder engagement. The benefits of participation (Sakwa, 2020)are to realize total ownership, decision-making, and financial contributions towards operation and maintenance. The reflections here concern why Community-Based Management of water supply systems which entails a water management system continuing "to work overtime" to make water flow for communityuse (Olajuyigbe, 2016). In the case of the SRWSP in Nadowli-Kaleo district. The sustainabilityof CBM involves seeing water management committees withdraw from much technical support to repair broken boreholes, minimal external support in financial support, and indefinite ownership of the facility (Ademiluyi & Odugbesan, 2008). There is no clear evidenceof SRWSP sustainability and impact since the project ended in 2015 in the Nadowli-Kaleo district.

There SRWSP project in Nadowli-Kaleo district is fashioned around the CBM model. What are the expected benefits of the community-managed SRWSP water supply model? If there exist any

benefits at all, how long do those benefits last? This is the central theme and the purpose of this research.

1.3 Research Objectives

To review the institutional arrangements and actors in the SRWSP programme and how they influenced outcomes in drinking water supply in the Nadowli-Kaleo district.

Specific Objectives:

To achieve the broad aim of the study, its specific objectives are to:

I. To assess the militating factors that work against the successful implementation of the SRWSP-CBM model;

II. To evaluate the effectiveness of extended external support by institutions to actors to sustain water supply end-user's participation in the CBM implementation;

III. To examine the extent to which local actors are supported to participate in water management at the rural level under the CBM model; and

IV. To determine the potential challenges and opportunities provided under the CBM model to sustain its benefits.

1.4 Research Questions

The main research question is to find out how the institutional arrangements in the Nadowli- Kaleo district serve as a support mechanism for actors to sustain water and sanitation supply underthe demand-driven SRWSP.

Specific Research Questions:

The specific research questions are:

I. What are the militating factors against the successful implementation of the CBM model?

II. In what way(s) do end-users participation in the CBM model implementation perceive outcomes in terms of technical and financial support towards sustainability?

III. How do community ownership and participation in the CBM model implementation contribute towards sustainability; and

IV. What are the potential challenges and opportunities provided under the SRWSP-CBM model for the sustainability of rural water supply systems?

1.5 Significance of the Study

This research is again useful to provide lessons to donors and policy-makers in the rural water supply sector. The demand-driven community-based management is a concept pioneered by donors including the World Bank and adopted by policy-makers as part of reforms under the Structural Adjustment Programme (SAP) in the early 1990s, during which involvement and ownership were identified as critical to the sustainability of donor-sponsored water projects (Gbedemah, 2010). The CBM participatory approach includes the use of local CBOs in decision-making, ownership of the local governance system that manages the water system, and community control in mobilising resources to sustain the operation and maintenance of water systems (Cunningham et al., 2019). The United Nations 2030 Agenda for Sustainable Development recognises the importance of the 'participation' of stakeholders in service provisioning. The agenda, in its preamble, emphasises its significance as a plan of action for people, the planet, and prosperity for the welfare of people. Contained in the UN 2030 Agenda for Sustainable Development are the seventeen (17) Sustainable Development Goals (SDG), which Jiménez et al. (2020) call "outcome targets (i.e., circumstances to be attained) and "Means of Implementation (MOI) targets" intended to bring development to people. SDG target 6b advocates to "ensure availability and sustainable management of water and sanitation for all". The ability to

manage and provide water and sanitation services sustainably are possible through the creation of an enabling environment through support and strengthening of the participation of local consumers and improving water and sanitation management in the medium to long term. (Alvi, 2016; Bhaduri et al., 2016; Sara & Katz, 2005). According to (Jiménez et al., 2020) there are five potential outcomes of participation as ensuring the legitimacy of the project, increased awareness among water end-users, a sense of empowerment through increased capacity and ownership, transparency, and accountability to managers and users, and enhanced sustainability of the project. The study provides a blueprint for water practitioners, actors, and stakeholders to measure the indicators of a working rural water system and sustainability in general.

Access to safe drinking water for all is increasingly becoming a concern to all governments all over the world. This is because there is a significant relationship between drinking water sources and the burden of disease among people in Sub-Saharan Africa. The safety of drinking water is highly dependent on the sources. Statistics from the Ghana Statistical Service based on the 2020 Population and Housing Census (PHC) suggest a decrease in the number of people who depend on borehole/tube wells as their main source of drinking water from 23.2% in 2010 to 17% in 2020 and pipe-borne sources of drinking water also decreased from 46.5% in 2010 to 31.7% in 2020. It is again in the same GSS report that total estimates of 13.0% of Ghanaians drink water from unprotected wells and springs and an estimated 1.1 billion people worldwide live at risk of being contaminated with microbial-related diseases associated with water intake. It is also estimated that 85% of diarrheal-related diseases among infants are attributed to the consumption of unsafe drinking water.

1.6 Organization of the Thesis

This thesis is divided into eight chapters. Chapter One formed the introductory part of this study in which an overview of the water sector is introduced with basic reference to the objectives, aims, and research questions of the thesis. In Chapter Two the basic components of the Community-Based Management concept and the theoretical basis for its introduction are presented. This was not done in isolation because the New Public Management (NPM) explained it further within the general context of public administration in developing countries. In Chapter Three, enablement is explained, and the distinct categorisation into market enablement, political enablement, and community enablement is also addressed. Chapter Four looked at the methodology and research design of the study. In Chapter Five, the findings of the results are presented to assess the level of sills of WATSAN Committee members in borehole repairs. Chapter Six examines the level of participation by WATSAN Committee members and the role played by women in operation and maintenance activities. In Chapter Seven, the study examines the major identified challenges to SRWSP implementation in the Nadowli-District and, Chapter Eight presents a summary of the research, discussion, conclusions, and policy recommendations.

CHAPTER TWO

RECENT DEVELOPMENT AND CONCEPTUAL OVERVIEW OF SUSTAINABLE RURAL WATER SUPPLY

2.1 Introduction

This chapter examines the literature on water supply systems under the CBM approach as a whole, with specific reference to the participation of non-state actors in water delivery within the context of the local government's role and its interface with local communities. Water is a vital component of sustainable development in every community, as access to potable sources of water ensures the well-being of people. Access to potable water is a basic need and its availability is vital for sustainable development, and it is a fundamental human right as enshrined in international declarations and conventions on human rights and the 1992 Constitution of Ghana. The United Nations (UN) Committee on Economic, Cultural, and Social Rights in 2003, for instance, stated the right of all to water sufficiency, affordable, physically accessible, safe, and acceptable water for personal and domestic use as necessary and emphasized the relevant role of institutions, especially in developing countries. As such, the importance of safe water to human development has again been substantiated in the Post-Millennium Development Goals (MDGs), Target 7c, as one of the parts of international efforts to reduce the proportion of people who lack potable water by the end of 2015 (UNICEF/World Health Organisation [WHO], 2012). However, large data gaps continue to dominate in the African continent in terms of empirical data collation on development indicators, particularly in sustainable community water supply management models. Chapter Two of this study is devoted to reviewing the literature on management models used in the sustainable delivery of services to rural communities in poor counties in Africa. The theories on management models and the conceptual framework used in analyzing the sustainability of water supply and sanitation are reviewed.

2.1.1 Top-Down Approach to Community Management and Implementation

The need for a new approach to water and sanitation services was appropriate and critical after the implementation and experience with the IDWSS Decade (191-1990). Evidence from the top-down approach showed that water supply systems failed to operate successfully without commitment from water users and their financial contribution towards management. Water users have to rely on central government for purchase of spare parts and repair of broken-down water systems (Fuest, 2005). For instance. The Upper Regions Community Water Project (URCWP) implemented by Ghana Water and Sewerage Corporation (GWSC) in the Upper West and Upper East regions between 1993 and 2000 and funded by the Canadian International Development Agency was with the main objective to increase communities' access to water in over 2,700 rural areas and to "enable these communities to assume ownership and maintenance of the water points" bythemselves (Nampusuor, 2001). Community water points formed committees and trained on hygiene and water utilization in each community on what was then referred to as Water UtilizationProject (WUP) in the Upper regions. Again, the project also recruited pump caretakers to clean source points and report faults to the relevant authority for action.

This shift towards the community management approach was intended to let beneficiaries of water, and sanitation services take "responsibility, authority and control" in providing water services. A beneficiary of a water project took responsibility through ownership of water and sanitation services, with total obligation to bear the cost of operation and maintenance. By beneficiaries taking authority, all legitimate power to make decisions regarding the water system was vested in the water user and thus entitled to take control and power to implement decisions regarding the water system(Komives et al., 2008). The community management system, therefore, is an

innovation that created collaboration between central or local government authorities and communities where none is seen to be superior to the other. The terms between central or local government authorities and communities are defined to facilitate effective implementation of water and sanitation supply and services. Notwithstanding the clear roles defined in their relationship, central government is seen as being stronger because of its ability to provide support services to communities in the form of subsidies or others that are technical natures.

2.1.2 Donor Partners' Response to Improve Water and Sanitation Supply

To response to the international call for improved rural water supply and sanitation delivery to low-income rural communities, the International Development Association (IDA), World Bank, and the Government of Ghana through the Community Water and Sanitation Agency (CWSA) funded the Upper West Region Sustainable Rural Water and Sanitation Project (UW-SRWSP) in 2014. This project assisted rural communities and small towns to construct and operate their potable water supply and sanitation facilities and also take advantage of water availability to improve their health status through improved hygiene and sanitation practices. This assistance from these International Organisations and agencies was in line with the paradigm shift in the sustainable management of rural water supply systems in the mid-1990s, which ensured the involvement of local community members as participants in the design through to the implementation stage. Nonetheless, this model/approach appeared not to be effective in the management of potable rural water supply and sanitation, even at the post-construction stage (which include technical and financial training) among community members in Nadowli- Kaleo district.

The expected outcomes in the demand-driven CBM model were a farce in the early days of its implementation. Although its implementation was decentralized to be closer to beneficiaries, water user teams had to travel for far distances to pay for water services that included purchase of spare parts (Whittington, 1998). Sustainability of the CBM was also a challenge as a result of the lack of training for local technical persons engaged at the beginning of water projects. Boreholes frequently broke down, compelling water users in beneficiary communities to return to use unprotected sources of drinking water. As a result, communities refused to pay for water tariffs when requested to do so(N. Salom & Khumalo, 2022). The governance architecture under CBM was also confusing as in some instances, community water team leaders failed to account for tariff contributions in their custody. This caused apathy in community contribution towards operation and maintenance of water facilities, thus causing repair of broken-down water facilities to take a longer time (Mah et al., 2016). By implication, the capacity, and skills to manage available funds were also problematic.

2.1.3 Demand-Driven Post-Construction Support Approach

The sustainability of borehole water delivery services is dependent on continuous support and active role of the various actors involved in the area. This role falls broadly into the broad areas of sustainability. The main actors in PCS includes area mechanics, District Water and Sanitation Teams (DWSTs)/District Assembly (DA), Community Water and Sanitation Agency (CWSA), Area mechanics, and, spare parts dealers. A major component of the community in the responsibility for the operations and maintenance. The DWSOs responsibility is to ensure that the communities have functioning Water, Sanitation and Hygiene (WATSAN) Committees. The WATSAN Committee members are to receive the necessary training and support they need to

operate and do minor repairs. They also help in the management of water use-related conflicts and sourcing spare parts for borehole maintenance (Kumasi, 2018; Kumasi & Agbemor, 2018). The DWSO also helps WATSAN Committees to link up with area mechanics if major repairs need to be carried out. These WATSAN Committees are set up by the community with some caretakers and attendants taking charge to daily routine maintenance and reporting on boreholes.

The WATSAN Committees work in close collaboration with "area mechanics" that were trained during the project implementation process to do routine repair and maintenance when called upon. They are also contacted or called upon to obtain spare parts needed by the communities and assist in installing these parts.

The demand-driven approach is made up of three (3) basic components. The first is households' involvement in the choice of hand-pump technology, governance, and institutional structure in the management of the water system. Secondly, it is also about giving space for a large decision-making role of women relating to water management and thirdly, it involves household readiness to pay for the capital cost of the water system and also a continuous contribution towards the cost of maintenance and operation (Komives et al., 2008). It is suggested that involving households in the choice of technology during the pre-implementation design of the water projects is important to allow for engineering designs to be responsive to the local needs and readiness of communities. Women engage with water systems (Domínguez et al., 2019; Tantoh & Simatele, 2018) more than men and as such must be accorded the role of participating in decision-making. Households' contribution toward capital cost "foster[s] a sense of community ownership" that increases community commitment (Etongo et al., 2018) toward self-management.

In the opinion of (Marks et al., 2014) the demand-driven planning of water and sanitation systems communities and households are obliged to make free choices as to the kind of services they want and indicate against this "want" with the commitment to be willing to pay for the cost of services provided after the project is installed. In essence, the demand-driven approach water supplysystem "incorporates information about household preferences into the planning process" without necessarily undermining the relevance of technical know-how from other stakeholders in the rural water and sanitation sector.

It is based on the challenges in implementing community participation and management of rural water supply that this study sought to explore the combined effects of the CBM model and the DDA on sustainable management of rural water services, using the NKD as a case study. The community management model was endorsed as the guiding principles of the Global Water conference (Sara & Katz, 1997; WHO, 1996; World Bank Group, 2016) to promote an integrated approach that included attitudes, procedures, and behavior and encourage the full participation of women at all levels. As already stated above, the Dublin and Rio conferences in 1992 (Agenda 21) called for water programs to adopt fundamental new approaches based on strong community participation for rural water supply sustainability, as well as initiatives to strengthen local institutions in implanting and sustaining water and sanitation programs (World Water Council, 2009). Agenda 12, therefore, paved the way for the juxtaposed relationship between the CBM and the Demand-Driven Approach. An institutional arrangement was important to operationalize this central government and community relationship in the rural water sector.

2.1.4 Government of Ghana Response to Community Management Initiative

The Community Water and Sanitation Agency (CWSA) were established by an act of parliament (Act 564) in 1998 as a statutory body to facilitate and manage water supply and sanitation implementation Strategy in Ghana. One major responsibility of the CWSA offices, which are decentralized throughout all regional capitals of Ghana, is to support District Assemblies (DAs) to plan and implement "safe water and related sanitation services in their respective districts" (Lane, 2018). The agency was formed with the objective to facilitate the provision of safe drinking water and sanitation services to rural communities and also to "promote the sustainability of safe water supply and close related sanitation services to communities and small towns" (Adank et al., 2013). The CWSA manages rural water and sanitation supply in Ghana based on the Community Ownership and Management (COM) model. Water and Sanitation management teams are expected to be supported to manage and pay for by users themselves. In short, the day to day management of water and sanitation facilities is left in the hands of Water and Sanitation Management Teams (WSMTs) whiles responsibilities for private operators are delegated to the private sector to perform on behalf of local government authorities. The CWSA has since its formation led the implementation of all government and donor-assisted rural water and sanitation programmes throughout the country.

2.2 Rural Water Supply Implementation in Upper West Region

2.2.1 Sustainable Rural Water and Sanitation Project Implementation in Nadowli-Kaleo

Sustainability in the context of the Sustainable Rural Water and Sanitation Project (SRWSP) refers to the ability to exist and develop without depleting natural resources for the future. The United Nations defined sustainable development as development that meets the needs of the present

without compromising the ability of future generations to meet their own needs. The sustainability of the SRWSP is structured on the availability of the water facility in the Nadowli-Kaleo District, access to safe water, functionality of the water systems in the district, and effective management structures to ensure sustainable management of the water systems in the district. It also includes effective governance and supervisory and monitoring structures to police the water systems to ensure compliance with laid down standards in the running of water systems in the district. It also encompasses the availability of spare parts for repair works to be undertaken by trained and certified area mechanics as and when the system breaks down. This is to ensure optimum operations of the water system to meet the Sustainable Development Goals (SDGs) set by the United Nations. Networking of area mechanics was also a critical component of the sustainability framework. The area mechanics network to solve complex challenges confronting a water system if the repair work is outside the skill set of a single mechanic. Finally, the mobilisation of resources for the operations and maintenance of the water systems and point sources in the Nadowli-Kaleo District plays a critical role in the sustainability framework. The Water and Sanitation Management Team (WSMTs) composed and trained to have the mandate to mobilize proceeds from the sale of water to ensure continuous operations and maintenance of every aspect of the water system.

2.2.2 Rural Water Supply Situation Before Sustainable Rural Water and Sanitation Programme Implementation

The Sustainable Rural Water and Sanitation Project (SRWSP) introduced in Ghana in 2010 by the World Bank was to provide improved water supply and sanitation facilities to some selected districts including the Nadowli Kaleo-District. The Project saw the construction of two (2) Small

Towns' Pipe Water Systems and several point sources in the Nadowli-Kaleo District. This project came at a time when most of the water facilities under the Water and Sanitation Management Teams (WSMTs) in the Community Ownership and Management (COM) concept were breaking down. The incessant breakdown of the Water Systems especially in the district arose from weak monitoring and evaluation structures at the time. The project came into inception when the communities were unable to mobilise enough resources to revamp broken-down water systems, leading to the consumption of unwholesome water by the people of the district.

2.2.3 Role of Institutions, Actors, and Agencies Involved in Sustainable Rural Water and Sanitation Programme Implementation

The institutions involved in the implementation of the SRWSP in Ghana include but are not limited to the Community Water and Sanitation Agency (CWSA), Regional Coordinating Councils (RCCs), Ministry of Finance (MoF), Ministry of Education (MoE), Ministry of Sanitation and Water Resource (MSWR), Environmental Protection Agency (EPA), Environmental Health, Department of Community Development, World Bank and Hygiene and Sanitation Promotion Consultants (HSPs). The Community Water and Sanitation Agency facilitated the construction of the Water Systems and point sources in the district. The mandate of CWSA was to ensure that the project was constructed according to standards as approved. The Ministry of Finance was responsible for the timely release of funds to the contractors through the CWSA to enable the project to be completed on schedule. The MoE provided their facilities for the construction of the school latrines in the district. The MWSR provided the policy and also ensured that the implementing partners operated within the confines of the policy. The Environmental Protection Agency (EPA) ensured compliance with the environmental and social standards of the project,

while the Environmental Health Directorate (EHD) supported the assessment of communities for Open Defecation Free (ODF).

2.2.4 Community Participation in Sustainable Rural Water and Sanitation Programme Implementation

Communities applied directly to the Metropolitan, Municipal, and District Assemblies (MMDAs) to register their interest in the water facilities. The MMDAs capture the candidate communities in their medium-term development plan for planning and shortlisting purposes. The MMDAs seek the services of Partner Organizations to conduct needs assessments on the candidate communities. The report on needs assessment is validated by a joint committee comprising Partner Organizations, the Community Water and Sanitation Agency, and the Metropolitan Municipal and District Assemblies. Approval of shortlisted communities is given by the Metropolitan Municipal and District Assemblies. A feasibility study was conducted by the Partner Organizations to confirm their eligibility for the project to commence. The Community Water and Sanitation Agency adopted those communities as beneficiary communities for the project to commence.

2.2.5 Structure of Sustainable Rural Water and Sanitation Programme Implementation

The Sustainable Rural Water and Sanitation Project were implemented in four (4) different strata across the country. They include the National, Regional, District, and Community levels with each stratum having a distinct activity to perform.

The national level of the SRWSP implementation is about ensuring that the project is implemented within the standards and guidelines of the Republic of Ghana liaising with ministries and donors providing technical backstopping for procurement, coordinating the allocation of financial

resources, and monitoring and evaluation of the project. The regional level was implementing project guidelines and facilitated procurement, formation of Water and Sanitation Management Teams (WSMT), organization of training for WSMT, engagement and sensitization of stakeholders and communities, and reporting project milestones. At the regional level, the Regional Coordinating Council (RCC) coordinates and provides technical advice for the implementation of the project. The Environmental Protection Agency (EPA) ensures compliance with the environmental and social standards of the project, while the Environmental Health Directorate (EHD) supports the assessment of communities for Open Defecation Free (ODF). The Ghana Education Service (GES) provided support and monitoring for schools' health promotion activities and provision of facilities under the project. The Water Resource Commission provided approval for the drilling and abstraction of groundwater resources. The district level is about ownership of the facility, monitoring, and technical support from District Water and Sanitation Teams (DWSTs). The DWST provided monitoring and technical support to actors at the sub-regional level. The community level was ownership of water facilities, mobilisation of resources for operations and maintenance, and setting of tariffs. The WSMTs were the governing structure for the sustainability of water facilities at the sub-district level.

2.2.6 Resources Needed for Sustainable Rural Water and Sanitation Programme Implementation

Land, Human Resources, and Financial Resources (2.3 million USD) were used to implement the project in fifty communities and two small towns in the Nadowli-Kaleo District. Fifty (50) boreholes fitted with Hand pumps were constructed as part of the implementation of the project. Ten (10) school latrines as well as several household latrines were constructed as part of the

project. The project provided vehicles (Toyota Land Cruiser and Nissan Pick-Up) for monitoring to ensure that the project was implemented according to specification. Training was organised for the district staff in procurement, finance, environmental and social safeguards, community sensitisation, and handwashing. PHAST tool kits, training handbooks, and soaps wereprovided as part of the project. The pro-poor was also supported to get Digni-Loos in their homesto eradicate open defecation. Sanitation markets were set up. The project ensured that both the Upper West Region and the District were given quarterly budgetary allocations to monitor the project.

2.3 Theories Used in Community-Based Management

This section discusses the theoretical framework, the conceptual underpinnings, and the conceptual framework. These are: concept of actors, concept of institutions, concept of rural community, concept of drinking water, concept of participation, concept of privatisation, concept of sustainability and the concept of Community-Based Organization. The reviewed theories explained how rural water users respond to emerging issues in respect of their participation in rural water supply, use, and payment of tariffs. These theories augment the understanding of water end-users' role in both operation and management of water supply services and how significantly their behaviour affect water systems sustainability. At the end, these theories unearthed therelevant concepts that informed the design of the conceptual framework of this study. The theoriesare the Public Choice Theory, Theory of Institutions, and the Theory of planned behaviour.

2.3.1 Public Choice Theory

The key assumptions of the public choice theory are related to the conduct of public administration involving the conduct of bureaucrats in self-interest, control of information flow, and sharing thoughts in the appropriation of public funds (Awortwi, N., & Helmsing, 2007). Firstly, the public choice theory claims that actors in the public service (bureaucrats, politicians, and voters) are motivated to act like any businessman whose interest is to maximise benefits from their daily transactions. The reasons for such behaviour are based on the conditions of the salary, service conditions in the office, power dynamics, public reputation, and patronage. Secondly, bureaucrats want to survive within the bureaucratic system, where government officials exist with the power to hire or fire. To restate this in its perspective, bureaucrats don't seek the welfare of the state/government, but rather their interests. Many public service managers ask whether the public sector was the best avenue to provide services. This is the reason for the proposition that the size of government has reduced, since the services they provide do not meet the needs of the public.

It is argued that bureaucrats' supply of goods to the public is based on a limited budget of the State while that of the public sector is influenced by private sector maximisation (Dick-Sagoe et al., 2021; Tarko, 2021). With profit-seeking in mind, the private sector is always tempted to increase production as a means of adding to profit margins (Pham et al., 2022). Another assumption of public choice theory is its assertion that the supply of goods and services by the government is usually hijacked by interest groups and powerful individuals in society (Aligica, 2015; Lane, 2018). The interest of these interest groups and individuals doesn't serve the interest of citizens. The results of this are likely to be a diversion of government attention from the provision of goods and services to economic management with the intention to provide and meet requests of interest

groups already being lobbied for from government (Frey & Moser, 2021). The cost of running the government will be forced to increase.

Another assumption of public choice theory is the one borrowed from the trickle-down theory effect in economics. This suggests that there are benefits to the State if authorities allow (enable) the private sector and business persons to operate independently of the State. In economic theory, the trickle-down effects of State support to the private sector benefit the poor through employment creation and payment of tax to the government(Mengiste, 2020).

Public choice theory from a different perspective posits that government officials behave in a manner that maximizes gain rather than furthering the public's interests(Rowley & Schneider, 2008) are consistent with this position but accept the approaches in economic analysis and political science that political actors work primarily to benefit their constituency. Public choice theory in simplified terms implemented basic economic tenets into political science analysis in terms of community project design, implementation, monitoring, and evaluation.

The public choice theory has been criticised with the assumption that every bureaucrat is aimed at individual interest (self-interest) than that of the State. It also argues that markets do not necessarily provide openness, competition, and information availability in a democratic environment but rather market distortions, lack of trust, and limited accountability.

2.3.2 Theory of Institutions

Identifying a common and single definition for institutions is difficult. The concept of the individual and the environment dictates their understanding of what social reality is and how it is

defined. The definition of institutions also differed based on the elements involved in it. In the definition of (Barzelay & Scott, 1997) institutions "consist of cognitive normative and regulative structures and activities that provide stability and meaning to social behaviour. Institutions are transported by various carriers-cultures, structures and routines-and they operate at multiple levels at multiple levels of jurisdiction". In the categorisation of the elements and institutional structures, three pillars of institutions identified are (a) cultural-cognitive (b) normative and (c) regulative. There are, however, multiple streams across different disciplines." This explanation enlarged the frontiers "as multifaceted, durable social structures, made up of symbolic elements, social activities and material resources" in his argument on the nature of institutions. These definitions suggest institutions are man-made rules that consist of "values, norms, beliefs, and token fulgurated assumption" (Barley & Tolbert, 1997) that serve as guidance and resulted in social order. In the pillars of institutions identified by (Scott, 2014) regulative focus on the strength and ability of institutions to control (constrain) and regularise human behaviour at a particular given time. The normative pillar emphasises the existing normative rules that prescribe the rights, privileges, responsibilities, and duties of persons in society. The cultural-cognitive pillar suggests the shared conceptions that are made up in the nature of social reality and the framework through which reality and meaning are made in lovely. According to (Barzelay & Scott,1997) the three pillars of institutionalism and the process of their legitimisation are as follows: "The regulatory emphasis is on conformity to rules: whereas legitimate organisations are those established by and operating in accordance with relevant legal and quasi legal requirements.A normative conception stresses a deeper, moral base for accessing legitimacy. Normative controlsare much more likely to be intermeshed than are regulative controls, and the incentives for conformity and hence likely to include intrinsic as well as intrinsic rewards. A cultural-cognitive

viewpoint to the legitimacy that comes from conforming to a common definition of the situation, frame of reference, or recognisable role or structural template. In summary, institutionalism operates according to relevant legal requirements that are based on legitimate and deeper comprehension of society. All these are based on the ability and acceptability to conformto recognisable situations. According to (Chopra & Ramachandran, 2021) use a similar categorisation in their study of institutional impact and performance in India's water sector.They suggest that water institutions and their impact on variables depended more on users' observations and acceptance of water law, policy, and administration.

In the understanding of (North, 1987) institutions are "humanly devised constraints largely embedded social rules that structure social interactions and create stable expectationsof behaviour imposing forms and consistency in human activities" for the good of themselves. According to (Ostrom, 2019) institutions are "prescriptions that humans use to organise all forms of repetitive and structured interaction" for social good. One key component inthe categorisation of institutions as formal and Informal is held by (Brinks et al., 2019) as the "written rules and procedures, which are expectation and actions required and forbidden, and enforced through third parties such as courts, legislature, and bureaucracies" of the state and community. Informal institutions are those that are "socially shared rules, usually unwritten, and communicated either orally or through symbolic representations" for society to obey. These distinctions and categorisations are sometimes seen as confusing, vague, and contradictory. In theargument of (Kingston & Caballero, 2009). The application of these categorisations in institutionalanalysis is a challenge to scholars.

In their application of financial, institutional, environmental, technical, and social (FIETS) framework in the analysis of water, sanitation, and hygiene programme among indigenous rural

people. In (Brinks et al., 2019) acknowledge the influence of institutional quality in the sustainability of water supply systems. In the framework of (Bandaragoda, 2006) institutions are the combination of policies and objectives, laws, rules and regulations, bye-laws, and core values within an organisation's operational plans and procedures, incentives mechanisms, norms, traditions, practices, and customs.

The relationship between an institution and performance is uncontested. It is therefore imperative for an assessment of how institutional changes affect levels of programme performance. Institutional reforms and adjusted frameworks are pertinent to achieving set goals in service provisioning in developing countries. Stakeholders in water supply agree that the major hindrance to attaining sustainability is the lack of a new institutional framework for the effective management of public goods the framework emphasises the institutional capacity to constrain and regulate the behaviour of end-users the three pillars of (Scott, 2014) which are applied in this study. The existence of a functional framework works as a precondition for the sustainable implementation of a water project. There is evidence that community nearness to officers for technical support, professionalism of personnel, efficiency in management, prudent financial management, and ethics in cultural consciousness are relevant to determining effective water supply systems.

2.3.3 Theory of Planned Behaviour

The Theory of Planned Behaviour was developed due to over limitations in the application of the theory of reasoned action (TRA) which states behaviour to determined by the intention to perform an act without duress. The TRA states that an individual act is a function of his/her personal attitude and behaviour which are also subjective to his/her norms, environment, beliefs, and

customs. Intentions of the individual to act in a particular manner are said to be centrally determined by volitional behaviour. In the theory of planned behaviour, the perceived behavioural control variable is said to account for the absence of volition control over the performance of behaviour. Behaviour is seen as people acting in manners with their intentionsand perceptions of control over their individual behaviour, while intentions, in turn, are influencedby attitude (AT) towards the behaviour, subjective norms (SN), and perceived behavioural controlof the person. The TPB suggests that the underlying reason for any behaviour is based on available information and beliefs to influence behaviour. The theory of planned behaviour proposes three predictors of beliefs that are relevant to behaviour as perceived behavioural beliefs, normative beliefs, and control beliefs.

Perceived behavioural beliefs are about mobilising the required resources such as skills, logistics, extended family support and general community mobilisation under favourable or unfavourable conditions to influence behaviour. Normative beliefs are determined by subjective norms. It is about the expectations of behaviour and how these expectations are managed by external influences such as social pressure to prepare to comply or not to comply. Control beliefs measures how the individual abilities, capabilities, and feeling of strength respond to his intention to behaviour. This controlled but the perceived behaviour control of the person (Moshi et al., 2018).

The essence of TPB is its ability to predict the willingness degree, effort intention, plan, and readiness of behaviour. In the expression of (Brandão & Gonçalves, 2021),"a behavioural intention can find expression in behaviour only if the behaviour in question is under volition, i.e., if the person can decide at will to perform or not to perform the behaviour". Itexplains further that behaviour performances depend on factors such as availability to respond to

requests and resources such as time, money, skills, and cooperation of others. Behaviour intention is recognised as a summary of the "advantages and disadvantages of an individual's inner judgement of whether to consider performing a certain behaviour" (Cheng et al., 2022). Measuring predictor variables is done directly or indirectly because of the beliefs of behaviour.

Scholars have criticised TPB on grounds of validity and conceptuality. It is further explained in their criticism that the four concepts are narrow and not enough to explain planned human behaviour and think that it is static and exploratory in nature and also "doesn't help to understand the evidenced effects of behaviour on cognitions and future behaviour". In essence, theTPB is limited in accuracy in predictability, especially with 'inclined abstainers' of individual behaviour. Particular reference is made to the non-consideration of a person's "emotions or unconscious behaviour" in predicting behaviour. Behaviour predictions are accurateif there are no control measures to the intentions of planned behaviour.

2.4 Concepts Used in RWS Sector

Operationally, since water service delivery is a development facet, 'actors' as a concept in this study relates to development actors. Development actors are stakeholders who operate at levels of spatial units, such as local, district, national, international and/or global levels in order to achieve some particular objectives according to their individual and collective interests. In the water sector, actors or stakeholders usually come from the public (government) sector, private (business) sector, civil society (ordinary citizens) and the community members of beneficiaries. Despite the importance of actors in the rural water sector development, not enough has been documented about the situation in the NKD. In particular, the identification, classification, interests, and roles of

actors in implementation of the demand-driven CBM model for sustainable waters services management were of interest in this study.

2.4.1 Concept of institutions

There are several conceptualisations of institutions. The most comprehensive definition of institution was given by (North, 1987), which sees, institution as some group, organisation, a sphere, or subsystem of a society, which is the embodiment of a special system of norms, rules or regulations, which dictate the probability of attitudes, interpretational, willingness, regularity of interactions and normality of behavior. In simple terms, an institution is a social unit, established as a group or social subsystem, with organisational and/or physical structures, which has rules, regulations, aims and objectives, and carries out intra and/or inter institutional activities and shaping behaviour, for the purpose of achieving its individual and mutual aims and objectives.

This study was interested in the identification and the roles of institutions from the public, private, NGO and community levels which serve as actors in the demand-driven CBM model of rural water services in the NKD, and the impact on sustainable water supply.

2.4.2 Concept of Rural Community

According to (Botchie, 2000), community is used to refer to a group of people living together in one place, especially where they practise common ownership of something such as living space; or where they share values, ideas, responsibilities, resources, religion, race, profession; or some particular characteristic that identifies and brings them together.

In instances where water is treated as an economic good, through commoditization or pricing is a priority, instead of a social good which is characterized by free access, the concept of rural areas is of concern because of the distinguished characteristics of such area. These which adversely affect their ability to pay for water services include smaller populations (below 5,000), over dependence on subsistence agriculture; high unemployment in the formal sector; low incomes; and low levels of access to basic services (e.g., water, electricity, schools, hospitals, and road networks). This study explored implemented demand-driven CBM models and the effectiveness of rural community people's participation in overcoming the challenges of rural water services in the NKD.

2.4.3 Concept of Safe Drinking Water

In the context of development, the provision of potable water of sufficient quantity and quality has the objective of promoting an acceptable standard of living (Cherunya et al., 2015). The provision of safe drinking water, also known as potable water, is, therefore, an issue of global concern. Potable water is said to be water that is different in terms of its source and condition under which it was produced. Water can be obtained from natural sources such as rain, rivers, or ponds. It is considered potable if it is obtained through the application of technology and is free from contamination or disease and, so, good for human use. Safe drinking water is water that is safe for human consumption if its consumption cannot cause sickness in the person.

Water became a commodified when neo-liberal or demand-driven approaches were introduced into the utility sector. Being focused on low-income rural communities of the NKD, this study has examined how payment for water through the demand-driven approach could still be of relevance in the determination of sustainable rural water services.

2.4.4 Concept of Community Participation

Community participation (CP) was initiated as a new policy direction by development partners and donor agencies in the early 1990s (Chukwuma, 2016; Riswan, 2021). The new initiative was a policy aimed at bringing closer to communities their role in managing local development. It is also intended to empower local communities, unleash their potential/skills, create a sense of ownership, encourage decision-making and control over water services provisioning (Awortwi, N., & Helmsing, 2007). The community participatory approach to water supply is tried in many countries around the world, especially in developing countries (Ademiluyi & Odugbesan, 2008; Cunningham et al., 2019; Komives et al., 2015; Malik et al., 2016; Whaley et al., 2019).

Community participation in service delivery constituted a review of the top-down approach to development interventions. It was basically applied as a form ofgovernance in rural water supply by urging communities and local agencies of theState to take responsibility for managing their own business (Komives et al., 2008; Kumasi et al., 2014). This kind of community management depends on the partners (actors/institutions) at the local level involvement and readiness to take cost in water facility management. These can be NGOs, private-sector players or community-based organisations.

Community participation agrees with the good governance conceptualisation of stakeholders in water supply. Schouten & Moriarty, (2004) captured the main component of community participation in water service at the community level as holding of periodic re-election of local community leaders as a mechanism to prevent possible capture of power by community elites to the detriment of the people, avoidance of political interference into the accountability architecture of water user committees (WATSAN Committee Members) and active participation of women in

the decision-making process. Women's active involvement in rural water resource management and decision-making is largely influenced by socio-cultural norms (Smits et al., 2013). A gender-sensitive policy that creates awareness is important to ensure men's and women's knowledge are factored into water project design and sustainability management. The dynamism of community participation and advocacies for its application for the promotion of rural water services have dominated mainstream literature in recent times. However, not enough empirical findings have been documented to show how newly emerging forms of community participation have an advantage over earlier locally induced forms. This partly inspired this current study.

2.4.5 Concept of Sustainability

According to (Hoko & Hertle, 2006; Machado et al., 2019; Whaley & Cleaver, 2017), something which is sustainable will not use more natural resources than the local environment can supply; more financial resources than the local community and markets can sustain; and will have the necessary support from the community, government, and other stakeholders to carry on indefinitely. Without appropriate capacity at different levels of government and the local level, services will not be sustainable. In this study, an examination of the capacity building and the participation of the community-based water committees in the management of water points in accordance with the provisions of the demand-driven CBM model were explored to measure how institutions and actors in collaboration with community-level structures influenced sustainable rural water services.

In the water, sanitation, and hygiene sector literature, many meanings, and interpretations are given to the word sustainability. It is mostly associated with the outcomes of water and sanitation projects and investments. These are mostly the benefits in the post-implementation period of projects with

expected benefits such as improved livelihood, improved health conditions, or time saved in individual daily activities (Schweitzer et al., 2014).

In providing social services, sustainability is affected by many factors including technical,physical, financial, organisational, and managerial (Jiménez et al., 2020). But in a very simplistic understanding, sustainability is the continuous supply of water/sanitation services with an accepted flow of characteristics for a longer period. Malik et al., (2016) in assessed urban solid waste management in Nairobi, Kenya categorized sustainability into three thematic areas. There are ecological sustainability, socio- economic sustainability and environmental sustainability. In assessing ecological sustainability, the author stated the effect of conservation and control of air pollution as factors influencing ecology. In respect of socio-economic sustainability, it assessed the ability to mobilise revenue resources for operation and maintenance with efficiency, effectiveness, low cost, and equity. With environmental sustainability, the common attribute is affording to live in a clean and healthy environment.

In the community-based drinking water and supply sector, sustainability is described as a kind of water system with the potential of providing safe drinking water that is sufficient for a longer period. This form of drinking water supply is based on community members engaging in operations and maintenance roles to sustain gains within the environment where the water system is installed and the ability to protect and preserve the water system from environmental contamination, ensuring technical sustainability that will see to frequent maintenance of infrastructure, economic sustainability to ensure financial sufficiency, social sustainability to guarantee equitable access to the service and institution sustainability that mobilises local community members to effectively manage the infrastructure with its human resources. The

literature summarises the basic elements of the CBM water supply system into five hierarchical components (Aslam et al., 2016). These elements are indicated in Figure 2.1 as shown below. In furtherance (Marks et al., 2014), links his definition of sustainability to water system infrastructure and categorised this into three namely the physical condition and functioning of the installed water infrastructure, end-users and water user committees' satisfaction with water supply services provided, and the impact provided by water user committees in terms of operational responsibilities that keep the water system running.

In the study of (Duchanois et al., 2019), the meaning of sustainability as being "about whether or not WASH services and good hygiene practices continue to work overtime. No time limit is set on those continued services and accompanying behaviour changes. In other words, sustainability is about permanent beneficial change in WASH services and hygiene practices". Aslam et al., (2016), as shown in Table 2.1 identified five components of sustainability, the factors that determine outcomes of the components, and finally, some sub-factors that further influence the components.

Table 2. 1 Elements of a sustainable CBM model in RWS

Component	Factors	Sub-Factors
Technical	Design and execution of distribution infrastructure	Design optimization Available pressure at delivery points Protection from external pollution Safety against external threats/disasters
	Maintenance	Physical condition Service interruptions Preventive and remedial maintenance
	Water quality in distribution system	Existence of treatment facilities Efficiency of treatment facilities Water quality at consumer end
Environmental	Source capacity	Present capacity of source Reliability of source over time
	Source quality	Water quality at source Water source protection
Economic	Financing	Funding availability for operations and maintenance Asset value decreases over service life time Reliability and continuity of finances
	Economic impact	Direct benefits to community members Indirect benefits
Social	Social awareness	Awareness of water-related issues Water usage practices
	Social involvement	Population coverage (quantitative) Equity/inclusion (different sectors)
Institutional	Community organizations	Existence of community organizations Effectiveness of community organizations
	Operation and maintenance (O&M) units	Existence of O&M units Skills and training of committee members Transparency in utilization of funds

Source : Aslam et al. (2016)

Participation and Partnership of Actors in RWS

2.5.1 Public-Private Partnerships

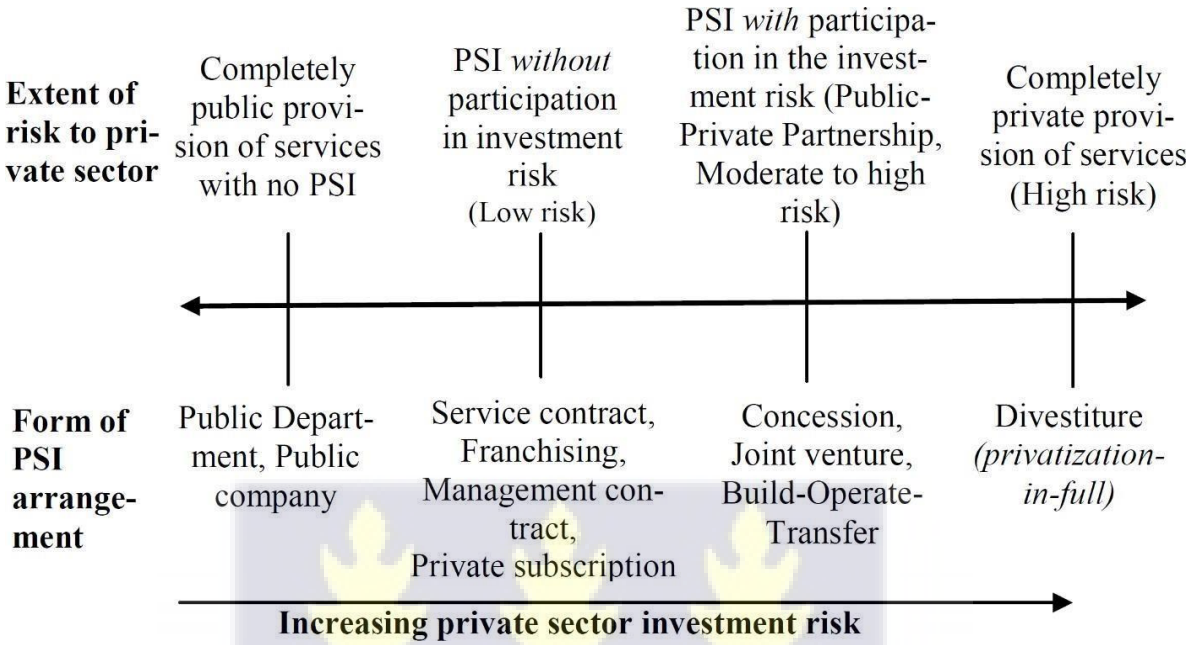
Private participation is sought in public service provision with expectations to introduce efficiencies in operations and investments (Awortwi, 2005b), contractual and commercial discipline, prompt government to put in place better rues for the sector, cost-reflective pricing system, and clear-cut policy and regulatory objectives. There is a wide range of private

participation options to transfer risks and responsibilities to the private partner. The modalities include service and management contracts, leaseholds, concessions, and in some cases, divestitures from the state to the private operator (Jugović et al., 2010).

The provision and management of water resources in the developing world have traditionally been considered government responsibility by the supply-driven model (Lane, 2006). Advocates of State-controlled strategies argue that access to water is a human right and that the State must ensure its access to the public (Neely & Walters, 2016; Prasad, 2006). More significantly, because of the huge capital investment required in providing services, proponents of public-private partnership believe that the State can guarantee its equitable distribution of goods and services through effective legislation on regulation (Akosua & Akosua Hoedoafia, 2019; Fabre & Straub, 2021). State control advocates stress that essential commodities such as water should never be treated primarily as a commodity based on market principles. This is because markets are purely driven by profit motives.

PPP is a form of a contractual relationship between a public/State agency and private sector operators where resources and risk are shared between the state and the private operator for the main intention of delivering goods and services effectively. It is mainly characterised by five features: (1) usually involve two or more partners; (2) partners are agents/principal agent depending on set roles; (3) the relationship among partners is stable and enduring; (4) transfer of risk, authority, and resources to private sector, and (5) responsibilities, outcomes, activities, and benefits mutually shared among partners (Oduro-Kwarteng, 2011). The risk associated with these forms of the contractual relationship between the State and private-sector operators is shown in Figure 2.2.

Figure 2. 2: Levels of Risk Sharing in Private Sector Involvement (PSI) in Service Delivery



Source: (Oduro-Kwarteng & Van Dijk, 2013)

Governance modalities in delivering services to communities through participation with the private sector suggest that it tolerates competition, which leads to improved services as markets are allowed to operate (Knafo, 2020). Local agencies of the State are expected to encourage competition in the marketplace through legislation, monitoring/evaluation, regulation, and facilitation. In the area of social services such as water supply, economic theory requests local government authorities to encourage local-level community participation in decision-making, set up tariffs that are affordable to the poor, use innovation and new technology, and set standards to ensure quality services. In essence, the purpose of PPP is to improve performance in the delivery

of public goods and mobilise extra private capital for further investment. It also improves efficiency and effectiveness and reduces the cost of delivering services to the public. Fakhrul, (2015) concedes that PPP contractual relationship minimises inefficiencies of the public service and reduces the cost of production through better incentive system for employers, freedom to hire quality workers, and the freedom to fire and ability to negotiate and pay lower wages without labour agitation (Awortwi, 2005a; A. H. J. Helmsing, 2002).

The purpose of fostering private sector participation in water services is to improve water efficiency and improve hygiene conditions at the rural level. As indicated, the NPM theory and public choice theory posit the fundamental reasons for private-sector participation in service delivery. Although PPP promotes greater outcomes in public service delivery of goods and services, there are challenges with how to construct benchmarks for a "win-win" outcome and monitoring operations of private-sector operators. Secondly, the ability of the private sector to ensure equity and fairness in the coverage of services to the underprivileged is key to success in partnership. Unclear partnership relations may lead to opportunistic behaviour in contractual partners (Oduro-kwarteng et al., 2014).

It is proposed that PPP designs, options, and interventions in rural water delivery that targets the poor should contain attributes such as expanded/increased investment to cover poor communities' water service reliability to minimise dependence on private water vendors, pro-poor subsidies, and life-line tariff structure to support lower-income households, establish low inform unit with established agencies to promote pro-poor issues, regulate high cost of private water services (Sohail Khan & Cotton, 2006) and initiate water connection system to support.

2.5.2 Public-Private-Community Participation in Rural Water Supply Sector

Public-Private-Community Partnerships (PPCP) are formal and informal relations between the public, private sector, and communities (Oduro-Kwarteng, 2011).

Rules governing PPCP relationship are both formal legislation and informal coordination in character. In this partnership, end-users of goods and services (water users) exercise responsibility through payment of tariffs, attendance at meetings, and setting up management teams (WATSAN Committees Members) to monitor the daily activities of service providers (SNV, 2015). The existence of PPCP is influenced by the extent local end-users' authorities support management teams, end-users' willingness to pay for goods and services, active participation of the community (especially women), and external follow-up support received for operation and maintenance (J. E. Castro, 2010).

After deliberations at the International Drinking Water Supply and Sanitation Decade (IDWSSD) between 1981 and 1990, greater recognition and emphasis on community management of rural water supply schemes are often made when referring to 'sustainability' (Braimah et al., 2016; Daluwatte et al., 2020; Mvongo et al., 2021).

Ensuring sustainability in drinking water supply is ensuring democratically elected decision-makers, an efficient water supply management system, training in operation and maintenance, transparency and accountability to the community water users, accessing and purchasing spare parts, setting appropriate tariff systems, as well as maintaining simple but effective financial records (Funck & Karlsson, 2020; Shields et al., 2021) and ensuring water source points are maintained and kept clean. Providing communities with access to local NGOs, local government authorities, donors and philanthropists as a 'back-stop' for follow-up external support is key to ensuring sustainability in rural water supply (Kheni, 2013; Kleemeier, 2000; Lockwood et al.,

2003). Although there are many different types of Public-Private Partnership operations in service delivery, this study attempted at understanding five models: (1) service contract; (2) management contract; (3) concession; (4) franchising and (5) leasehold (Sohail Khan & Cotton, 2006). This is further explained in Box 2.1 below.

Box 2. 1: Types of Contractual Arrangements in PPPs

Contracting out: The client contracts out services to the private sector for a specific package of work (e.g. customer billing, specific maintenance tasks). Private sector role is limited to its tasks.

Management contract: Private sector takes over responsibility for part of the operations (e.g. all of operation and maintenance); client retains responsibility for system expansion and other capital works

Lease: The private sector organisation is responsible for providing agreed levels of service to customers and for providing working capital for repairs. The main tasks are operation and maintenance but with a greater degree of autonomy than for management contracts

Concession: The private sector organisation is responsible for financing the investment costs of the system including system expansion, as well as for all of the operation and maintenance, in order to achieve prescribed service delivery objectives.

Full divestiture: In addition to responsibilities for service delivery, ownership of existing assets (e.g. the physical infrastructure of the water system) is transferred from the public to the private sector. In the arrangements previously described, ownership of assets remain with the public sector.

Source: Sohail Khan and Cotton (2006)

2.5.3 Service Contract

A service contract operates when "the public sector essentially hires a private organisation to carry out one or more specified tasks or services for a period of five to seven years" (Bennett et al., 1999). It is usually an agreement between the State and private entrepreneurs with a specific task for a fee to produce goods and services. Management remains with the public sector. Price competition is introduced through an open invitation for tenders from private firms by the State. The central government maintains the sole responsibility for determining the quality of services to be provided. In effect, the private firm typically has a relationship with the service users. All financial agreements are made directly with the government, and the government is responsible

for the initial capital investment needed to expand and improve the service infrastructure. Proponents of service contracts believe contracting out to the private sector will result in a lower cost to the central government since it will be free of the many labour-related management problems in many developing countries.

Secondly, contracting out has great potential to improve system monitoring since delivery is split up and agents with specialised skills perform functions with high efficiency. This separation (split up) introduces arm's length relations between the government and agents (Awortwi, 2005b), thereby improving high efficiency in their production. Since contracts are reissued frequently, private firms will be under continuous pressure to perform satisfactorily and at a low cost. Subsequent bidding by other competitors can crowd out an agent with a high-cost service delivery proposal. There are, however, some weaknesses to contracting-out PPP agreements. Research in service delivery (especially in water and solid waste management) in most developing countries is clear that contracting out is much more successful where the terms and evaluation parameters are clear and easily defined - where the contract can be subjected to renewal and re-negotiation regularly (Griffo et al., 2021). Secondly, contracting out does not guarantee significant private-sector capital injection into the service delivery and infrastructure. It, therefore, means that the effectiveness of the private sector is subject to the ability of the public sector to make available financial (capital) resources. The backwardness and poor financial position of Third World countries compelled them to most often than not, award contracts to the lowest bidders without considering the need for the private sector to provide a high-quality service to consumers (Bennett et al., 1999).

2.5.4 Concession

Concession agreements exist where government involves the private enterprise (concessionaire) to deliver a service in a specified area, including "investment required to create the service at its own cost and operate the service at its own risk" and all related operational, maintenance, collection and management functions (Kupisz, 2022). The private service provider (concessionaire) is however responsible for any capital cost, investment, upgrading, and expansion of the system out of the fees paid by users of the service. The public sector is purely responsible for insisting that the performance standards are met by the concessionaire. Under a concession agreement, the service provider may maintain indefinite control, ownership, and operation of building services (Danylkiv et al., 2020) such as (build, own and operate – BOO). In another instance, the concessionaire may transfer it back to the government after a specified and agreed on period (build, operate and transfer – BOT or even (rehabilitate, operate and transfer – ROT). It is expected that the time for the transfer will depend on the time needed to recover the initial sunk cost or investment made by the concessionaire. In order to avoid the exploitation of consumers by private firms, the government fixes fees and sets conditions for review. One potential advantage of concession is the ability of the private sector to inject the initial capital for the construction and rehabilitation (Shor et al., 2021) of the service facility. The disadvantages of concession are the unwillingness of the government to adjust prices when necessary to meet changes in the international market for fear of its political consequences. Secondly, long-term concessions are vulnerable to political manipulation when there is a change in government, bribery and corruption. Thirdly, the difficulties in predicting the performance of the market make bidding conditions and contractual frameworks for concessions extremely hard, especially when the concession is expected to evolve for a long time (Zhang & AbouRizk, 2006). Ex-ante and ex-post costs strongly

depend on exogenous factors (Mingaleva et al., 2014), sometimes uncontrolled by the concessionaire.

2.5.5 Franchising

Franchise arrangements are often used by the government to regulate the private-sector provision of public utilities. In franchising, the government gives exclusive rights (a finite–terms zonal monopoly) to a private contractor to deliver a service and collect fees directly from beneficiaries (Grzelak & Matejun, 2013). The government then taxes the service provider through surcharges. Competition is introduced through competitive bidding (tendering) for franchises. The franchise is granted for a specific, defined period and may be revised and re-negotiated (Alon et al., 2021) at a regular given interval. The potential advantages of the franchising system are that the private sector is responsible for the risk and cost of billing and collecting user fees. A greater portion of user fees is expected to be collected by the private firm to defray costs, hence the recovery rate is expectedly high. Secondly, the government is insulated from the task of buying and maintaining equipment. Thirdly, users pay for service directly and as such, the contractor is compelled to deliver high-quality services as consumers will resist paying for poor services. One disadvantage of franchise is the possibility of the principle of "publicness" to be defeated (Awortwi, 2005a) when in the desire of the private provider to maximise profit, fees are highly charged.

2.5.6 Leasehold

A lease contract is made when a private operator rents the assets of the government to provide a service for a specified period. The private provider assumes the commercial risk in the operation, maintenance, and management of equipment. "The efficiency incentive for leaseholders lies in the

difference between the operating cost (including rental fee) and collected revenue" (Awortwi, 2005a). The government maintains its role as the sole owner of the assets and is responsible for system expansion, upgrading, investment, debt servicing, and financing initial capital investment. One advantage of a leasehold contract is that maintenance costs are transferred to the private sector (Burgess & Karampour, 2020). A disadvantage of a leasehold is that the lease still bears the cost of technology and the risk of the lessor's inability to recover the total cost when the lease period expires.

2.6 Community-Based Management in a Global Context

Gomez & Nakat, (2002) point out that traditional approaches to community participation in water and sanitation projects have been distinctly top-down and undemocratic. Participation of end users in decisions around water and sanitation access initiatives can improve ownership, technology, knowledge, and maintenance capabilities of community members, leading to the sustained maintenance and upkeep of water systems (Koyra, 2020). The concept of participation in social and human development is not an entirely new phenomenon and it can be traced back to the ancient Greeks (Cornwall, 2006; Nagpal & Bandyopadhyay, 2020). Contributions by the beneficiaries increase the level of commitment, sustainability, and probability of success of the water project. Community participation has become popular in development discourse and practice, particularly regarding water resource management.

In Sub-Sahara Africa and especially the rural water sector in Ghana, Community- Based Organizations (CBOs) are formed to collect water user fees and partner with spare parts shops to operate, repair, and maintain water facilities. Strong community participation knowledgeof the technology used for water infrastructure (Bhandari & Grant, 2007), ability and willingness

to pay user fees, availability of spare parts to repair facility when faulty, and strong external back-up support mechanisms play major roles in the sustainability of rural water supply systems (Achanso, 2015; Quartey et al., 2010; Slaymaker & Newborne, 2004). A World Bank country study on Ghana and Bolivia found greater community participation in project implementation and community-based management (R. C. Carter et al., 2010), encouraging increased external technical and financial support (Fuest & Haffner, 2007) as some influencing factors to rural water supply sustainability for the two countries.

In recent times, there has been a new emerging model being implemented by various development actors. One such model is a Community-Based Management model. The Community-Based Management model is one of the strategies adopted to enable a community to be self-reliant in terms of having greater control and responsibility in water service delivery. The Community-Based Management model has emphasised the need for wider partnership with development partners, Non-Governmental Organizations (NGOs), and private-sector participants as an effective alternative for local end users at the community level (Whittington & Hanemann, 2009). In other related studies (Waheed & Azhar, 2022) identified three broad benefits of CBM: empowerment, sustainability, and enforcing community management. CBM has a supply-driven component and a demand-driven component, both reinforcing water systems' sustainability. But of particular relevance to this study is the demand-driven approach.

2.6.1 Sustainability in Rural Water Sector

The commonest and most well-known definition of sustainability is the one given at the Brundtland Commission session of the United Nations dubbed Our Common Future, in 1987. Here, it was termed sustainable development and defined as “development that meets the needs of

the present, without compromising the ability of future generations to meet their own (UN Water, 2018). The report emphasises sustainable development, not as an event but as a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with the future as well as present needs. This is consistent with thoughts on sustainability in the rural water and sanitation sectors.

The University of Michigan Sustainability Assessment is built on the Brundtland Commission concept of sustainability. It widens the concept of sustainability to involve direct and indirect critical inputs that it broadly categorised into four, namely ecological, material human and social (Rodriguez et al., 2002). A decade later, the University of Vanderbilt extended the scope of sustainability to include any harm caused to any of the identified components of sustainability (Senbeta & Shu, 2019). With the widened definition of sustainability and its componentsas categorised in the University of Michigan Sustainability Assessment, it identified motivating end users in pre-construction and post-construction project design, organising the requisite local capabilities and technical support, cost recovery mechanisms, and continuous extended technical support as being important for project sustainability (Rodriguez et al., 2002).

Sustainability is not exclusive to only ecological landscape or planning approach. Its long-term concern is with the interdependent relationship between the economy, environment, social health, and well-being. Its focus is not intended to only prevent environmental decay. This explains why sustainability is expressed as the '3Es', to mean Environment, Economy, and Equity. The relation among these 3Es in sustainabilities (Environment, Economy, and Equity (as [social-environmental]) is seen in Figure 2.1. Each of the 3Es has its parameters clearly outlined in Figure 2.1.

Figure 2. 1: Three Spheres of Sustainability in RWS

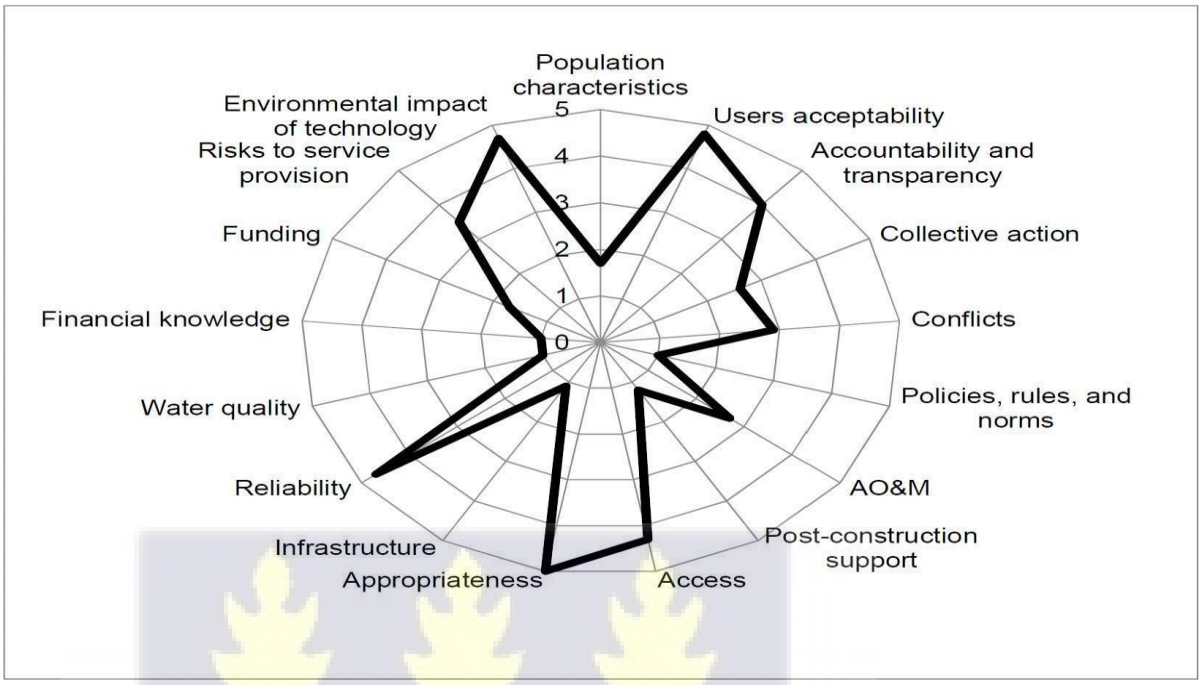
Source: Rodriguez et al., 2002

According to (Angmor et al., 2016), sustainability of social service is determined by factors such as financial, physical, organisational, and managerial. In the view of (Mvongo et al., 2021) the indicators of water sustainability are assessed (cost, information/needs), planning (resourcefulness, project design/capacity of personnel available), and participation (attitudes, values/worldviews). Fortunately, other scholars have successfully linked sustainability to water services. For instance, (Sara & Katz, 1997) asserts that the indicators of sustainable water services are the physical look of water infrastructure, consumer satisfaction with water quality and supply, and community willingness to raise cash for maintenance and operational services. This literature still appears in a broader scope as it fails to focus on the specific area of interest, which is rural water services. In this context, (Bachelor, 2005), in a study of monitoring and evaluation systems in a typical rural water and sanitation system, reported that sustainability indicators include measuring management

performance, operational performance and hygienic operation performance in water delivery services.

It is still obvious that despite the literature above being focused on sustainability in a broader scope, and the rural water sector in particular, the participatory component of water resource management is still missing in the perspective. In response to this, efforts have been made to develop a framework for the evaluation of rural water supply sustainability (Adank et al., 2018; Schouten & Moriarty, 2004; Schweitzer et al., 2014; Shields et al., 2021; Tantoh & Simatele, 2018a). In a typical context, a study assessing indicators of sustainability in rural water supply systems by (Domínguez et al., 2019) identified 17 attributes of the community-managed water system. Using what is called a multi-criteria analysis (MCA) the study assigned weights in an evaluation matrix to assess the attributes of rural water sustainability. The 17 attributes as shown in Figure 2.2, do not only include community collective action in participation, but also the characteristic of the end-users community population, end-user acceptability of new technology, committees' level of accountability and transparency in dealing with users of water facility, conflict resolution manner of O&M, rules governing water management, post-construction support system, infrastructure, and level of water source reliability are indicators of CBM sustainability.

Figure 2. 2: Attributes of a Sustainable Rural Water Services



Source: (Domínguez et al., 2019)

The weakness of the sustainability matrix as developed by (Domínguez et al., 2019), is that it failed to admit that the sustainability of functioning water systems could be threatenedby increased demand for water use as a result of increased population growth, the conflict between water users and their managers, unskilled water committee members in respect of local knowledge, compliance, legislation, operation and maintenance, which haveearlier on been addressed by the 3Es model of (Rodriguez et al., 2002).

It is also important to note that the scale of sustainability of rural water services is dependent on the environment of project implementation. For instance, community awareness and the acceptability of the water system is the first step towards sustainability. This is alsosynonymous to the social dimensions of the model by (Rodriguez et al., 2002). Community

participation spurs when it accepts to pay towards O&M and also actively takes part in useful decision-making toward project sustainability. The incorporation of aspects of the 3Es and the sustainability matrix as a conceptual tachometre is necessary for the effective evaluation of the roles of community-level structures in ensuring sustainable rural water services under the demand-driven approach of the community-based management model for the achievement of the second and third objectives of this study.

2.7 Enablement in Community-Based Management Model

The globe witnessed an unprecedented failure on the part of developing countries to manage essential social infrastructure in the latter part of the 1990s. This was as a result of the weakness in governments to strengthen the capacities of institutions, management skills and harnessing fresh investment to augment capital expenditures. The result of this was a massive deterioration in public infrastructure including rural water service delivery. For instance, rural water delivery waspoor including unavailable spare parts for broken down water supply systems, overcrowding at thesource point because of increase in rural population and poor maintenance culture. The consensusreached by experts in rural infrastructure development was for governments in developingcountries to create the enabling environment for communities to own and manage their own infrastructure at the community level. The contention was that without the right enabling environment, rural water users will continue not to innovate to improve service delivery. For instance, community counterpart contribution is said to promote a sense of ownership just as feescollection, private-sector involvement (PSI) to make spare parts available/area mechanics to makerepairs and local community skills to do repairs are agreed as necessary community enablement. In essence enablement, as asserted by the analyst make infrastructure provision right and lead to

efficiency, cost maximisation and quality service delivery.

Experts have proposed varied management mechanisms targeted at improving access to water in the developing world (Bayu et al., 2020; Dosu & Hanrahan, 2021; Mumssen et al., 2018) Notable among the suggested models are the demand-responsive approach as opposed to the traditional supply-driven interventions (Andres et al., 2016; Bakalian & Wakeman, 2009; Pleasant, 2005; Whittington et al., 2009) With this, the demand-responsive approach was popularised in Africa in the 1990s by major development organisations such as the World Bank. The concept, therefore, is anchored on the concept of Community Participation (CP), which advocates greater beneficiary involvement in water service production and management (Whittington et al., 2008). It includes beneficiaries taking the initiative to demand improved water services while at the same time taking a leading role in project design, implementation, development and sustainability. The demand-responsive approach requires beneficiaries to own the system by constantly making meaningful contributions either in the form of cash or labour to community-based water projects (Sara & Katz, 2005). It is premised on the belief that community involvement ultimately leads to better-designed projects, better-targeted benefits, and more cost- effective and timely delivery of water. Most significantly, CP is seen as effective in terms of equitable distribution of water and incurtailing corruption and other rent-seeking activities (Borja-Vega et al., 2017; Mingaleva et al., 2014; Obeta, 2018). Several water projects in rural villages in Africa and Asia have been established based on the demand-responsive model with varying degrees of successes (Ihsd, 2004; Komakech, 2020; Macri et al., 2013).

Policies in Africa implemented through local authorities and decentralized agencies of the state have been assumed not to be successful because of the 'fairness' of the policymaker from the point of implementation. Some analysts have attributed this to the inactive role exercised by local

government authorities at the community level (Del Carpio et al., 2021; Senbeta & Shu, 2019). It is a major criticism of the top-down approach to project implementation. In the view of the New Public Management (NPM) approach, the central government has been urged to rather give a helping hand by creating an enabling environment for lower agencies established at the decentralized level to minimize the burden of top policymakers and the challenge of bureaucracy in developing countries).

The concept of enablement is discussed at three levels,, namely market enablement, political enablement and community enablement (Mugumya, 2013). In short, the conducive space created for agencies of the state/non-state rather than the central government to deliver services at the local level is referred to here as creating enabling environment. In the rural water and sanitation sector, it is the role of a comprehensive framework of events by representatives of interested actors at the community level in monitoring and evaluating outcome mechanisms.

The literature in the WASH sector concludes that the success of an enabling framework depends on the favourable political environment, good water quality, existing local entities specialized in water system planning, regulations drafting, and a coordinated external support system (Whaley et al., 2019). Community water systems committee members should have the ability to periodically adjust user fees acceptable to the different categories of households – those who can afford them and those who need to defer payments until a time that the household resources can afford them for them.

From the perspective of the enablement and governance discourse, enabling environment is the kind of policies made at the national level of the state that consciously intends to give non-state actors in the informal sector roles to deliver goods and services effectively and efficiently within a specific, well-defined area. In the context of this study, how the state is seen as a driver and

motivator, reassuring, and engineering the activities of local institutions and actors in the enablement of the application of CBM model for ensuring sustainable water services in the NKD was the priority exploration.

2.8 Enablement and its Operationalisation in Rural Water Supply

Implementation of development projects demands devolving powers to decentralized local government institutions. The argument has always been that the decentralisation of powers and decision-making to local government authorities and local actors at the community level will increase local people prioritising their choices, and preferences for specific development interventions, ensure quality outcomes in development interventions and reduce cost (lower cost per unit) in development interventions. It is, however, difficult to argue for or against any of the positions (central/local government) roles in project interventions and the subsequent outcomes. In a document published in 2018 by the UNDP entitled Sustainable Development Goal 6:Synthesis Reports 2018 on Water and Sanitation varied means to achieve better outcomes about sustainable development goal 6 on sustainable drinking water were identified, amongst them are local partnership and community participation. The report further called for the government to structure governance along a path of increased stakeholder participation. The report was emphatic that "governance is increasingly moving beyond government and taking account of cooperation with other stakeholders including the private sector". This aligns well with the new thinking that government shifts its roles from its previous positions and remains a development implementer to a new role of an "enabler" that creates paths for the non-state actors to provide goods and services to communities. In short, government has to assume this new role to "facilitate and regulate the framework in which other actors (or service providers) can make their most effective

contributions" (A. H. J. Helmsing, 2002).

The effort to re-state the need to "roll back" the State in service delivery and rather facilitate the process of creating the enabling environment is echoed by the World Bank and its partners in a report in 2018. The Word Bank calls for health providers not only to be keen on quality health service delivery by providing only the infrastructural needs of communities, the welfare of health providers, or availability of medical supplies but that it must include a deliberate focus of government on equity, integrated efforts of all stakeholders and people-centred service provided through motivated community participation. The reports partly state that "involving people and communities in their care and the design of their health services is now recognised as a key determinant of better outcomes. People who are actively engaged in their health and care suffer fewer complications and enjoy better health and well-being" (Majuru et al., 2012). The report elaborates on the new position of health service administration provided by the State as an 'enabler' of development intervention. Enabling other actors (State and non-State) may include the private sector, communities, CBOs, and markets.

In their evaluation of new reforms in the delivery of health services and outcomes (Lim et al., 2021), they found that "by spurring the introduction of community mobilisation, enhancing intersectoral coordination and strengthening", village development committees and CBOs play roles entry points of community awareness creation and galvanizing community attention to provide basic infrastructure for development. In supporting community mobilisation as key to service delivery at the community level, (Simfukwe et al., 2021) added that the "availability of money in individuals or households alone cannot give effective health delivery without the collaborative efforts of organisations and other actors.

The literature on enablement as seen by many of the earlier authors is a follow-up on what is

already enunciated in the United Nations Centre for Human Settlements (UNCHS) report titled "Global strategy for shelter to the year 2000", which was published in 1988. The report acknowledged the "enabling" approach as a mechanism that will provide shelter to the increasing urban population in developing countries. According to (A. H. J. Helmsing, 2002) the position of UNCHS and expanded the urge for the state to restrain itself in providing goods and services but rather it should "concentrate less on direct intervention and more on the creation of incentives and facilitating measures to enable housing and other urban services to be provided households themselves, CBOs, NGOs, and the private sector". The intention of involvingall actors and institutions is to unleash the capacities and potentials of communities, actorsand institutions in the production and improvement of goods and services to beneficiaries. The United Nations Development Programme (UNDP) Human Development Report (1990) provides the reasons for the need for government to facilitate rather than implement at the local communitylevel. The reason is the limited resources of local government authorities will mean mobilizing other energies of actors available.

The report added that the alternative to gaining from the capacities and energies of actors was for the government to "shift from directly providing services to enabling others to provide them - be they formal and informal producers, community-based and non-governmental organisation or the urban residents themselves" (Burgess & Karampour, 2020). In the enabling approach, the concentration is to position the government as a facilitator and not a service provider, market efficiency role led by the private sector and not the government and allowing markets to operate freely on their own and then government intervention when and where necessary. Governments should create an institutional, financial, legal, and regulatory framework for individuals, enterprises, households, and communities to provide basic services. The government again should

intervene to mitigate market failures as its enabling role. Proponents of government enablement through mitigation for market failures, however, warned that government intervention should come only to regulate rather than directly disrupt its operation.

The concept of enablement is somehow confusing and thus causing some authors to attempt to make distinctions in its real application. It is understood as a "bottom-up" approach to policy making and implementation. The confusion with the concept of enablement is connected to the proposal that a development project's success is related to community participation. But others think that water practitioners' approach to development should be based on specific local conditions relating to the culture, knowledge, political power structure, economics, and social organisation. Voice and knowledge are power to the marginalised, but they can be "manipulated by power relationships" to the disadvantage of the poor (Mubita et al., 2017). The criticism states that empowering the community through the enablement of other actors doesn't necessarily lead to community empowerment. It further went ahead to suggest that the empowerment of local actors is determined by the kind of participation, and methodologies in place such as the existing bureaucracy, administrative structure, and resource allocation.

To understand the concept of enablement will mean making a distinction of it in three waves namely, market enablement, political (state) enablement, and community enablement. This is IN the British local government system of enablement. He stressed that enablement, as earlier discussed in Chapter 2 under NPM, includes modalities such as contracting out, consumerism, community planning, community leadership, pluralist collectivizing, and community participation.

2.8.1 Market Enablement

Market enablement is closely associated with neoliberal economic thinking. The neoliberal

economic policy did not only target macro-economic stabilisation by getting domestic utility prices 'right' but also a tool to reduce the role of the state, particularly its functions in the production of goods and finance (Knafo, 2020). Furthermore, the World Bank, International Monetary Fund, and other major donor institutions have changed towards a liberalized-markets orientation – thus making the private sector and other non-state actors recognized as major actorsin the functions of markets in Third World economies. The role of the state has thereforebeen redefined where the roles of the state and market are redrawn. Particular importance is placed to the state when activities that used to be an integral part of the state are active now in thehands of non-state actors for both profit and non-profit reasons. The public sector is transformingitself continuously by re- arranging the assignment of responsibility, most notablythrough decentralisation of functions to local and regional governments and sub- contracting specific functions to non-state actors.

According to (A. H. J. Helmsing, 2002), government "facilitates and promotes the formal and informal business sectors and entrepreneurs to provide market solutions for the production, distribution and exchange" of goods and services. It means that there should be no direct involvement of the government in the provision of services. The state in an attempt to playthis role will jeopardize market structures and introduce indiscipline in the marketplace. (Bah & Artaria, 2021) suggest that the state should contract-out services to private participants in entrepreneurship. The strategy of the government to induce private capital investment to increase productivity is to restore confidence in the marketplace through policy reforms by removing obstructions in markets, mobilizing excess capital from the private sector, encouraging entrepreneurially and skills development and introducing skills/innovation to take advantage of and deliver services to the

public. It is expected that subsequently market enablement will increase the availability of goods and services, reduce cost, elongate growth, and create employment and sustainable availability of services. Central government involvement in the provision of services, according to (Awortwi, N., & Helmsing, 2007), will further encourage government "monopolies, suppressing of entrepreneurial behaviour, limiting choice, over producing unwanted services, and encouraging waste and inefficiency." It rather suggests that private sector participation in the market encourages competition, and freedom to choose, increases efficiency, avoids market fragmentation, and supports coordination.

2.8.2 Political Enablement

According to (Burgess & Karampour, 2020) as cited in (A. H. J. Helmsing, 2002), political enablement is "a transformation in the structure and functions of central and local government, the relationship between them and their relationship with the market and community". He posits that political enablement is achieved when there is "political/administrative decentralisation, democratisation, managerial and institutional reforms, the widespread use of NGOs and community-based organisations and through adaptive enabling strategies towards the markets and community in the allocation of material and financial public goods and services". In relationship with decentralized institutions, political enablement is more enforced and effective with not only local state organisations but also with organised committees at the community level. The connection between political enablement and the market is the right of local government authorities to enter into partnership with the private sector to participate in the provision of goods and services through modalities such as contracting-out, franchising, or concession.

Political enablement is, however, valued when it gives voices to community people in decision-making. Within the context of rural water supply sustainability, political enablement is the ability of local government authorities to facilitate water user committees in mobilising resources towards systems repairs, participating in project design, identifying the right technology to use, bookkeeping financial records, choice of leaders through a democratic process and setting a timeframe for change of leaders. It also includes transparency and accountability in operation and maintenance, local capacity to repair breakdown water supply systems and involvement of women in decision-making.

2.8.3 Community Enablement

Community Enablement is "a strategy adopted by central and local government to coordinate and facilitate the efforts of the community and neighbourhood-based organisations to initiate the plan and implement their projects according to the principles of self-determination, self-organization, and self-management. Community enablement is a strategy targeted at reducing the failures of the state and markets. (Awortwi, 2005b) refers to this as "a double jeopardy" meaning a failure on the side of the market to deliver goods and services and further complicated by the failure of the state to do the same. In developing countries, rural communities are identified as usually as constraints in terms of essential goods and services.

Recognition is given to communities to engage their own 'resources' to initiate collective action in planning and executing development interventions. Local government authorities are obliged to enable communities through skills development, human resource training, and choice of appropriate technology to sustain community-initiated projects.

Although community enablement is seen as a means of empowering communities to plan and implement their projects, authors such as (Stigger & Therkildsen, 2006) think it could be an exit

path to neglect deprived communities and the poor to struggle for survival. It is because of this that proponents of communities' enablement went further to suggest ways to push communities to higher performance beyond the survivalist status.

This is the reason why (A. H. J. Bert. Helmsing, 2004) sees enablement of the community to be the process of creating appropriate legal, administrative (including financial), and planning frameworks that will facilitate community organisation, management and action. In the same vain, the three levels of support identified for community enablement are planning, administration and or financing, capacity development for community members in the decision-making process, quantities/quality of services to produce, and role of citizens' participation in effective project implementation. In essence, the ties between central/local government and the community should be strong to produce improved outcomes in the provisioning of goods and services.

2.9 Operationalisation of Community Enablement in Water Supply Sector

The rules and legislations put in place by the central government to regulate the actions of actors at different levels (in this particular instance community-based level) to improve service delivery in a decentralized environment are important to support efficiency (Malik et al., 2016). The "helping hand" to release finance, resources, and competence to the organisation and local government agencies in rural water provision is expected to influence the 'functionality' of water projects (Whaley & Cleaver, 2017). The binary definition of 'Functionality' simply means "working" or "not working". This definition is adopted in the study to explain community water management teams and water delivery systems. The analytical framework used three broad sets of sustainability functionality indicators 1) service levels (quality and quantity of water served to end-users); 2) functionality (physical condition and functions of a supply system); and 3)

upkeep (factors, including external follow-up support that affect performance in operation, maintenance and administration (Andres, Deb, Giannone, et al., 2017).

Implementation of PCS in a CBM delivery service is the ability to leverage local community-level best practices if it is delivered quite early in the life of the project (a soft part of the project). This suggestion proposed a longer period of CBM implementation in the hands of the end-users. This enables them to explore all the best management practices to support project management. Community-based user committee and CBO's ability to combine traditional values and administrative principles introduced by the CBM model led to impacts useful to the community. The synergy reinforces the management of rural water supply projects and makes them sustainable over the long term. This caution is considered in this analytical framework adopted for the study. Community management of rural water delivery is thought of as a mechanism to achieve a given policy goal at the least cost. By transferring hand-pumps ownership and operational responsibility to community end-users, the state provides the technical and financial means by which individuals can access improved water services. Community water management of water emerged as a modality to enable community-level actors through incentives and motivation for them to manage and monitor effective water service delivery. The strategy is tailored towards local requirements for domestic and productive uses of water. However, over the last decade, there have been increasing concerns that communities are not able to manage hand-pumps reliably with implications for public health and poverty reduction(R. Carter et al., 2011; Daluwatte et al., 2020). Community management is a unitary, benign, effective, and apolitical approach that has been labelled as a 'myth' by research in common pool resource management in Africa. The decentralisation of rural water supply to rural communities is an aspect of enablement, and local level institutions are promoted to take active roles and responsibilities in water management

and service delivery. In this instance, the state has enabled the community. In assessing water and other infrastructure in Africa, it is reported that central, regional, or local governments play dominant roles in all aspects of energy, road and water infrastructure provision. It is also revealed that it is only in the area of providing and maintaining water services that local communities have a leading role (Pârvu & Voicu-Olteanu, 2009; Truslove et al., 2020). Challenges and difficulties that persist in water management and supply are identified as major obstacles to rural water availability. It is the paradox associated with the concept of community enablement and performance outcomes that this study is devoted to it.

2.10 Factors that Strengthen Enablement in Water Supply Sector

Based on some parameters such as ability and willingness to make financial contributions, attendance of meetings, and functionality levels of water facilities, CBM for rural water facilities is believed to have succeeded in some communities and failed in others (Aashiq et al., 2020; A. Harvey, 2021; Oliveira & Matos, 2022). The literature attributes the differences in levels of functionality and performance of CBM models of service delivery to factors within and outside of the targeted communities (Tadesse et al., 2013). Further, the literature also shows that while the increase in coverage of safe water may improve in areas where water users have participated compared to where they have not, maintenance of the water sources, which is their responsibility has remained a big challenge (Kohlitz et al., 2020; Nyaga, 2020). This meant that participatory and demand-driven processes are necessary but not sufficient conditions for the functional sustainability of point-water facilities. The discussion of the literature on the factors that affect the effectiveness of community-managed water facilities has been categorised into micro or community-level factors and factors external (WaterAid, 2020) to the communities, and

attributable to relations and hierarchical processes at the micro and macro levels of service delivery that tend to characterise most public policy frameworks.

2.10.1 Community Enablement and Post-Construction Support Services in Water Supply Sector

Technical support is a requisite to improve the community-based management of rural water supply systems. Post-Construction Support helps CBM to overcome the uncertainty of participants existing at the local management team level (Komives et al., 2008) by introducing andenforcing legal and regulatory requirements that constrain the actions of the members of the CBM team. Post-Construction Support (PCS) is defined as structured and systematic support that is provided by an outside agency" (Ababa & Verhoeven, 2013) for local actors to improve community-based management of water supply services. Researchers in the rural water sector have largely come to the consensus that community water systems need externally supported actors after they are constructed. This support they argue should be in the form of post-construction technical assistance (Akanbang, 2015; Schweitzer et al., 2014). Structured and systematic direct support is said to have the potential of preventing poor maintenance culture and limiting threats to sustainability (Brikke & Rojas, 2001). Post-Construction Support in community-based management is the degree of support that service providers seek and records from external agencies. There are also indirect external support services in the form of cogent legislation, policy, and institutional framework within which water supply services are provided. This involves policy formulation, planning, regulation, sector-level monitoring, and institutional capacitybuilding (Global Water Challenge -Washington DC & LLP, 2012).

The World Bank in recent studies has concluded that in the demand-driven model of rural water

supply services, there is a link between project implementation and sustainability (Sara & Katz, 2005). It is believed that the long-term sustainability of projects could be undermined without regular follow-up support, market availability of spare parts, lack of technical skills for operation and maintenance (O&M), and capacity of repairers and facility caretakers (Schweitzer etal., 2014). The application of community enablement through the use of decentralized actors implies local actors' engagement with water user committees to provide supply and management services at a sustainable level. Indeed, the community enablement approach is confronted with challenges ranging from limited funds, and skills development (Mubita et al., 2017; Samuel et al.,2019) to transparency and accountability (Braimah et al., 2016; Shields et al., 2021) and issues relating to water committee leadership.

2.10.2 Determinants of Enablement in Sustainability in Community-Based Management

Studies have consistently demonstrated that effective CBM systems are a necessary precondition for functional sustainability of established point-water facilities and increased equitable access to safe water (Carter, Richard C and Rwamwanja, 2006; P. A. Harvey & Reed, 2003; Schweitzer et al., 2014).

However, CBM thrives on a functional and enabling policy and service delivery environment that, among others, allows articulation of the need to address water sector and community-specific needs (Martinez-austria, 2016; Rogers et al., 2003). For CBM to produce sustainable outputs, it also requires a strong and combined commitment from service providers and beneficiaries to support the work and motivation of community-based structures referred to in this study as Water Sanitation Committees (WC), and on which the wider CBM dynamics depend (Bartram et al., 2018; Miller et al., 2019; Shields et al., 2021). Accordingly, sustainability of the service is affected

by the technical knowledge of water users, physical attributes of the system, financial, organisational (support functions) and managerial capacities of the service providers from outside the community. In providing a precise meaning of sustainability in the context of CBM, Carter and (Carter, Richard C and Rwamwanja, 2006) developed interventions that include the promotionof technologies that require maintenance, periodic repair, and eventual replacement and institutional or financial mechanisms that cater to operation and maintenance. They also carefullydistinguish the notion of project sustainability of rural point water supply and management complexities. They argued from a time-dimensional perspective, a concept that is popular with functional sustainability. A newly constructed water facility may fail to work due to obstacles in obtaining a spare part from dealers. This could be a result of constraints internal or external to thecommunity. When this happens, then there is a breakdown in service. Functional sustainability is,therefore, a function of regular facility maintenance and continuous service yield. However, thesedepend much on the extent to which communities are motivated to participate in overall governance and management of facilities (Del Carpio et al., 2021; A. H. J. Helmsing, 2002; Kumasi, 2018; Kwaku Kwashie, 2009).

2.10.3 Public and Private Sector Participation in Small-town and Rural Water Supply Projects

The Structural Adjustment Programme (SAP) marked a global consensus that state management of public infrastructure could not guarantee its sustainability. Reforms under the SAP that promoted and encouraged private participation in the management of publicly funded infrastructure projects were hoped to deliver the much-desired sustainability of these projects. A campaign for private involvement in the delivery and management of public services was the

overriding objective of SAP. The purpose of a higher degree of economic efficiency, according to market economics, is to induce a market-style public service that resembles management service in the private sector. This section reviews the concept and application of New Public Management (NPM) - Public Private Partnership in service delivery.

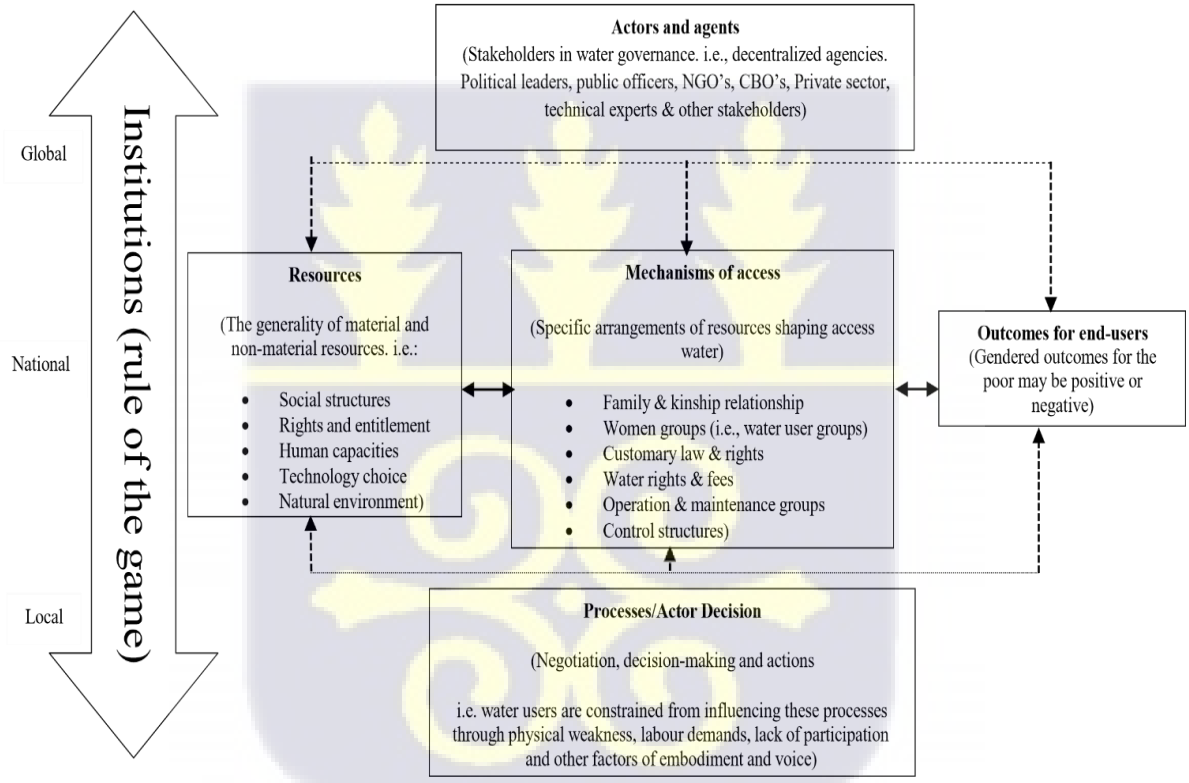
2.11 Operationalisation of Research Concepts

The study adopted an conceptual framework used for analysing borehole water management among poor communities (Fig 2.4). The framework emphasis is on the interlinking relationship of a "network of alliances and partnership for the services" that community service providers expect to enable them to sustain their service functionality (Cleaver et al., 2005).

The study hypothesises that the sustainability of Post-Construction Support services in a CBM depends on favourable enabling environment that supports synergies from all actors, many theories, concepts, and organizational/management models were examined, including their application in varied jurisdictions and contexts. These constitute the input dimension as shown in Figure 2.5 of the conceptual framework. The management and organisation theories used in are Public Choice Theory, Theory of Institution, and the Theory of Planned Behaviour. These theories are combined and compared with the management models to understand the relevance of their propositions in public administration within Africa especially within the context of water governance in Ghana. Emerging synthesis of the theories and management/organisational models and their contextual relevance of enabling the environment that provide the understanding of input indicators of the analytical framework. Neo-liberal reforms in the public service delivery of goods and services with varied actors and institutions provided the avenue for decentralized actors, private-sector participation, CBOS and NGOs to participate in activities for the implementation of management models in service delivery. This constituted the output side of the conceptual

framework. The concepts used in the conceptual framework are (1) 'actors' activities and decision-making processes (2) 'institutions' linkages in the CBM model (3) 'project sustainability' factors, and (4) 'expected outcomes' of external support to end-users.

Figure 2. 3: Conceptual Framework: Actors and Network Relationsin CBM model RWS Services



Source: Adapted from (Franks & Cleaver, 2007) and adjusted by the author

This analytical framework is within the "good water governance" discourse discussed at the Ministerial Declaration of the fourth World Water Forum in Mexico (Martinez-austria, 2016) and

applied within the context of public administration and organizational management. Governance is conceptualised within the normative principles of accountability, transparency, and probity with the mindset of the sectoral network of actors and institutions to achieve outcomes in rural water supply (Jiménez et al., 2020). In their study of the water resource management framework based on the works of (Rogers et al., 2003). According to (Cleaver & Franks, 2008) the core governance functions as policy, strategy, coordination process, planning preparedness, financing, management arrangement, monitoring, regulation and capacity development. The analytical framework is developed round the concept of water governance in this study as a combination of political, social, and economic systems, including services provided by the public service (government) and other services (society) in the private sector. These are illustrated in Figure 2.4 where the resources (material and non-material) of stakeholders (NGOs, CBOs, political leaders, private-sector participant, and public service) are the social structures, rights and entitlement, human capabilities, technological choices, and natural environment. These are input indicators that constitute the variables (spare parts availability, transparent/accountable water management team, technical skills capabilities, available area mechanics and financial capacity) of this study. These are determined by enabling follow-up support factors (mechanism of access) at the global, national and community levels.

Depending on the 'mechanism' and choices, output indicators are expected to be favourable or unfavourable. This approach helped the study to answer questions on the current management capabilities of water users at the community level. The conceptual framework suggests that the existence and functioning of a CBM model depend on an active and participating local water user committee, external support from stakeholders to local committees in water user communities, available spare parts, and system mechanics to support repairs when boreholes break down. In

effect, it means that what public services make available to other actors, policy guidelines and regulatory frameworks act as catalysts to providing an enabling framework to sustained service provisioning (WaterAid, 2020).

The primary data collected were focused on forms of technical support from external sources, level of awareness of households in pre-construction planning, participation, and decision-making processes. Primary data were also collected from caretakers on their level of skillfulness, training, technical assistance, frequency of repairs and access to spare parts. Also, primary data were collected on WATSAN committees on their functions, source of authority, source of administrative and technical support and tariff structure and collection system. With women involvement in the water delivery services, the study also focused on the militating factors against the general implementation of the CBM model, especially relating to participation in project planning, tariff structure and satisfaction with boreholes. This approach helped the study to answer questions on the current management capabilities of water users at the community level.

This conceptual framework adapted concepts from social theory (allocation and authoritative) resources that actors (agents) support to negotiate to reform social structure. It posits that post-institutionalist thoughts shaped local institutional arrangements and their construction. Sustainability of livelihood (resources/capital) is seen as what individuals draw on basically as community resources to cope with the variables that exist and affect livelihoods. In essence, it leads us to the understanding of the multi-dimensional ways in which people seek to access water resources but are constraint as a result of their physical environment and noninvolvement in local decision-making processes. The framework depends on a number of key words for its analysis. They are resources, mechanisms, outcomes, process, and agent.

Resources are the “hard” and “soft” materials required by water users to govern water systems.

These material resources are allocative (raw materials, means of production, produced goods) and authoritative (social space, relationship with others) in society. Resources in rural water system comprise of power dynamics and relationship and other resources allocation which are shaped by the capacity of the agent to exercise power. The key resources (authoritative and allocative) are institutional, social networks, rights of the individual, entitlement, technology, andthe natural environment. Mechanisms are conceptualised in this framework as those social resources that are drawn by individuals, groups, community, or state through diverse mediators from institutions to form norms that allow free choice of a particular technology. These technologies are considered complex and socially embedded to include mechanisms that that drawon social resources, rights of the end-user and empowerment of marginalized groups.

An intended management practice is said to have an effect on outcomes on a service delivery. The outcomes are varied forms of outcomes such as service quality, quantity, gender sensitivity and services available to end-users. For instance, the degree of inclusivity or exclusivity of end-users at the community level shapes their power structure and dynamics. As a result of this interaction, the conscious and unconscious activities that produce changes in the outcome go through a process. By implication rural water designs produce unintended outcomes. It is clear from the above trajectory of resources; mechanisms work together through a process that is expected to produce an outcome that affects sustainability. Agents (actors) interact at all points to "shape and be shaped by the resources, mechanisms and outcomes" through many processes. Theframework recognised participation of actors in water resource management as a purposive inter-relationship among agents (Cleaver et al., 2005; Leclert et al., 2016).

Based on the above conceptual framework, the study intends to ascertain whether links and interconnectivity of resources (e.g., technology choice), mechanisms (e.g., water end-

users, watsan committees, and caretakers), processes (e.g., community participation, women involvement in project design) and actors/agents (e.g., WATSAN Committees, localgovernment, CWSA, NGOs) contribute to outcomes (sustainability) of rural water supply systemsin Nadowli-Kaleo district.

2.12 Conclusion

The purpose of this chapter has been to explain four issues: (1) issues relating to understand the theories of public administration; (2) the distinction between privatisation and Public-Private Partnership (PPP); (3) the application of privatisation and PPP in the provision of services; and (4) concept of sustainability within the context of market competition. The chapter, therefore, concludes that: The assumption is exaggerated that the private sector is perfect is not true and as such enables the public sector to work efficiently. Until the bureau (public sector) put in place the requisite mechanism, and regulation and cope with those fundamental issues that cause effectiveness by the public sector, the same outcome will occur even with the introduction of market forces to regulate the private sector. Market principles can be weighed against practices in the public sector. The fact remained that the technological and economic capacities of the agent must not be underestimated. Lack of capacity by the principal to make proactive decisions in its regulative, monitoring, and facilitative roles can still make the expected outcomes in contracting out to the private sector not workable. The new forms of managerialism that require multiple modalities demand vigilance, further research, and study. Turning to the private sector to seek solutions as an alternative to the western-sponsored interest to reduce the role of the state in the public sector can lead to disastrous results for governments.

CHAPTER THREE
CONTEXTUAL BACKGROUND AND INSTITUTIONAL ARRANGEMENTS IN RURAL WATER SUPPLY SECTOR IN GHANA

3.1 Introduction

This chapter begins by identifying the actors, institutions, and the relationship among them in the rural water supply sector in Ghana. The chapter also describes the roles each actor/institution plays in delivering water to rural communities. These actors and institutions are found in both the public and private sectors. It is important to note that some of these actors/institutions are involved in policy formulation. Studies have revealed that private sector participation (PSP) in the delivery of services leads to improvement of service outcomes through private injection of resources and technological transfer. Public-sector actors are mostly said to lack the financial resources to invest in facility improvement in the rural water sector. They are also criticised for their inability to employ personnel of high-quality capabilities to deliver goods and services to communities. The legislation and regulatory framework in Ghana to support RWS are examined and discussed, and the bottlenecks to effectiveness are discussed.

3.2 Public Institutions in Rural Water Sector

The Ministry of Sanitation and Water Resources (MSWR) is responsible for managing water resources and sanitation. It is mainly involved in the formulation of policies and planning. It is also responsible for total water management and evaluation of programmes initiated by the government, donors, and development partners. Within the MSWR exists a water directorate with the role of coordinating matters relating to water and sanitation services. There are also other key

agencies of government such as the Water Resources Commission (WRC), Community Water and Sanitation Agency (CWSA), Ghana Water Company Limited (GWCL), Ministry of Local Government, Decentralization and Rural Development (MLGDRD), and Metropolitan, Municipal and District Assemblies (MMDAs) that are mandated by law to play roles that are consistent with the national policy on safe drinking water and sanitation services to rural communities.

3.2.1 Ministry of Local Government, Decentralisation and Rural Development

The MLGDRD exists to ensure good governance practices at the Metropolitan, Municipal, and District Assemblies in the country. A key function of District Assemblies is also to promote local economic development. Within the MLGDRD is the directorate of Environment, Health, and Sanitation charged with the responsibility of coordinating all activities relating to water and sanitation. The MLGDRD through this directorate liaises with MMDAs to enhance water and sanitation activities in all communities.

3.2.2 Community Water and Sanitation Agency

The Community Water and Sanitation Agency in the relationship with the Ministry of Sanitation and Water Resources promote the provision of water and sanitation services in rural communities. At one point, the CWSA also facilitates the provision of small-town water projects. The CWSA Act 564 authorises it to "promote the sustainability of safe water supply and related sanitation services in rural communities and small towns" and to enable District Assemblies to encourage engagements with local communities and women in the design, construction, and implementation of WASH programmes in the communities. The major objectives of CWSA are

(1) to formulate strategies and guidelines for the sector; (2) to coordinate activities of NGOs and donors in the water sector and encourage private-sector participation in rural water services. Having the responsibility of coordinating operators in the rural water supply, CWSA contracting-out services to private operators in borehole drilling, supply of hand-pumps, and sale of spare parts and repair tools.

3.2.3 Metropolitan, Municipal and District Assemblies

Ghana's decentralisation system supported the creation of Metropolitan, Municipal, and District Assemblies (MMDAs). They are responsible for providing water and sanitation services to rural communities and small towns. Providing infrastructure developments is contracted to private-sector providers and management of water facilities is left in the hands of CBOs at the community level. As mandated by the Local Government Act, MMDAs prepare development plans that cover water and sanitation issues as well. Located in the MMDAs are the District Water and Sanitation Team (DWST) members from the decentralized departments in the District Assembly, namely the Works Department, Planning Unit, and District Health directorate. This DWST is headed by District Water and Sanitation Officers. District Water and Sanitation Teams constitute themselves into a committee to assist MMDAs to shortlist applications from potential beneficiaries of water and sanitation programmes advertised from the national and regional offices of water agencies. During the pre-construction phase of projects, DWST supports WATSAN committees in fixing tariffs and general management skills intended to improve outcomes in the project. As shown in Fig.3.1 below, responsibilities assigned to all units differ from each other, The Regional Co-ordinating Council (RCC) is the highest administrative and political body in the region. It acts as the intermediary between MMDAs and the central government, which is represented by the

Ministry of Local Government, Decentralisation and Rural Development. It is headed by the regional minister who is appointed by the President.

The RCC comprises the regional minister, deputy regional minister (s), two chiefs nominated by the Regional House of Chiefs (RHC), MMDCEs from MMDAs within the region, and all regional heads of decentralized departments in the region. However regional heads of decentralized institutions do not have the right to vote during deliberations of the council. Apart from the RCC, all MMDAs are administrative, legislative, executive, and planning powers vestedin them.

3.2.4 WATSAN Committees (Household Level)

Since the concept of community management was introduced as an approach to allow local participation in water and sanitation service delivery, the basic unit responsible for ensuring local content is the Community Water and Sanitation (WATSAN) committees. The committees are made up of seven elected voluntary persons from the community. Like part of the requirements, women are expected to be part of these committees. They are assisted and trained by CWSA in the operation and maintenance of boreholes/small standing pipes in rural communities and small towns. WATSAN Committees have the right to 'contract' outside suppliers to provide services to the community. Community pump caretakers, area mechanics, and spare parts dealers are contracted from time to time if needed skills for O&M are beyond the capabilities of local knowledge. This is a requirement set by CWSA, donors, and partners in the WASH sector as a precondition to benefit from water and sanitation programmes. As part of the responsibility towards the community, WATSAN Committees set up tariff structures, bank accounts, transparency, accountability criteria, calling of meetings, and general management role of water

facility. They also act as a conduit through which information is transmitted to and from District Assemblies. It is a consultative body responsible for post-construction support activities through DWSTs in general operational matters.

3.2.5 Private Sector Operators, Civil Society and Non-Governmental Organisationss

The research in the field revealed the existence of NGOs, CSOs, and private-sector engagements in the provision of water and sanitation services. There are three levels through which NGOs contribute to the WASH sector in providing technical assistance at both pre-construction/preconstruction phases of project implementation, providing water facilities, and capacity development at the management level. Some notable NGOs in rural water and sanitation are ProNet North, Water Aid and World Vision International. Private-sector operators in the study area are Water Vision Technology Ltd (WVTL) based in Wa who are specialised in the importation and sale of spare parts for boreholes. Private consultants play a role in providing services to CWSA in the initial phase of the projects. Among the consultants who played a role in the implementation of the Upper West SRWSP is Maalu Foundation for Rural Development (MAFORD), who conducted community sensitisation and mapping for CWSA and the World Bank. Private companies are usually contracted after a tendering process and contracts are awarded to them for borehole drilling and installation of hand-pumps. They also repair, replace, or clean boreholes when there is a breakdown.

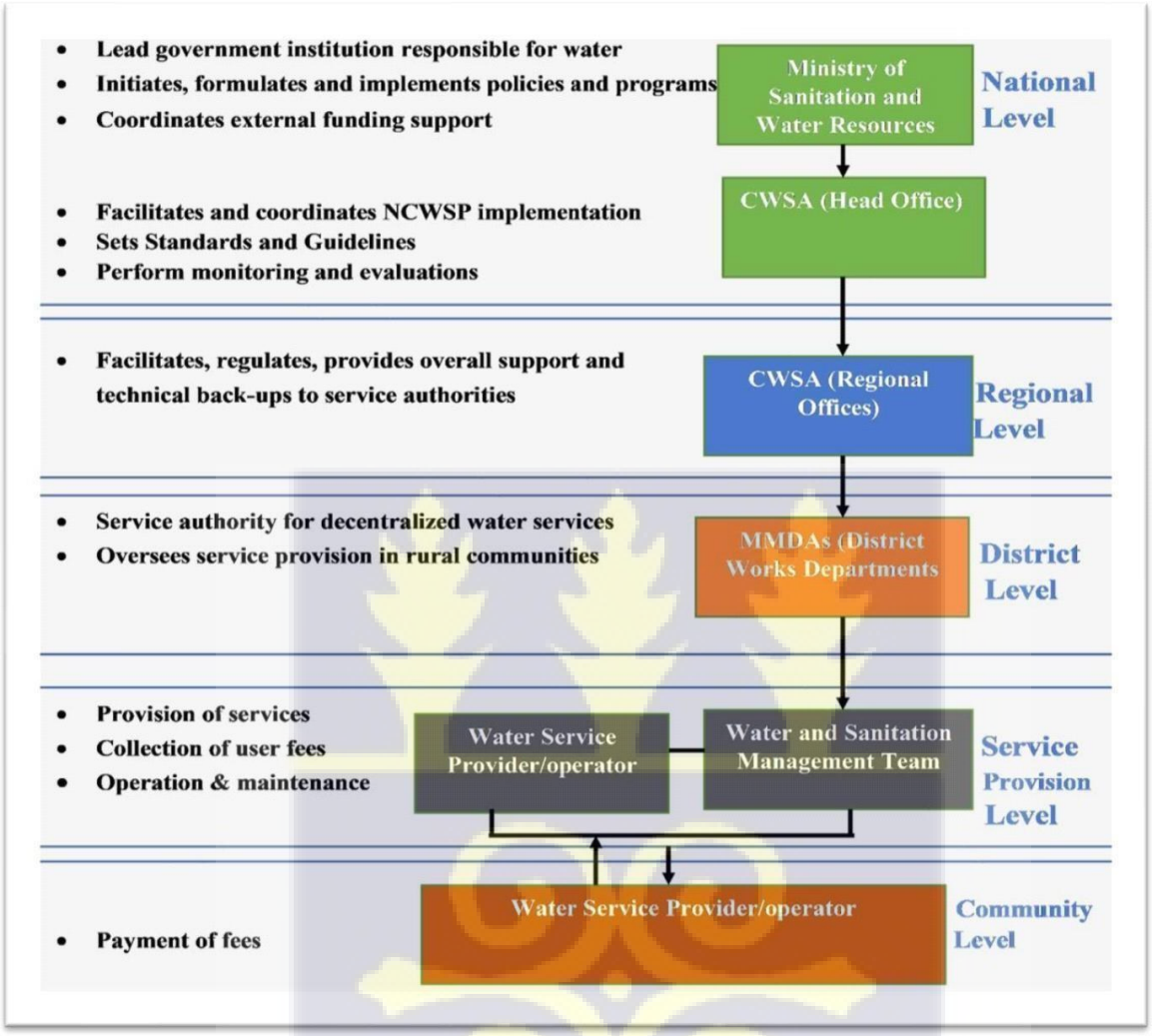
3.3.1 Water Resources Commission, 1996 (Act 522)

The establishment of the Water Resources Commission in 1996 was a response to the promulgation of the 1992 Republic Constitution of Ghana. Ghana's Water Resources

Commission (WRC) is the sole state agency responsible for water policy coordination, regulation, and management. Comprehensive plans are made to utilise water resources, conserve resources around water bodies, and also improve general development within the water sector. The WRC is also responsible for initiating, controlling, and coordinating all water resources in the country. Sections 13- 24 of Act 522 vested the power to use or regulate all water bodies, and abstraction of water resources for personal use without the expressed permission of the President. The WRC acts on behalf of the President through the use of water resources to ensure environmental health, prevention of water resource pollution, and granting of water use rights to individuals and communities. The right for compensation after altering the right to use water resources is a prerequisite of WRC. As shown in Figure 3.2 below, WRC operates as an independent entity but within the centre of other line institutions of the state. The lead government institution in policy formulation is the Ministry of Water Resources and Sanitation. For the facilitation and coordination of national community water and sanitation programmes, the headquartersof CWSA set standards and guidelines to conform to state policy direction. They also monitor the implementation of standards and guidelines set by themselves. As part of deliveringthe decentralisation policies of the government, regional offices of CWSA also facilitate, regulate, and provide overall technical support to back up policy implementation at the community levels in the regions. District Assemblies has the authority to oversee the constant flow of water and functioning water facilities in all communities within their jurisdiction.

Users of water at the community level are responsible for making contributions from within themselves to maintain water systems.

Figure 3. 1*: Organizational Structure of Actors/Institutions in RWS*



Source: (Dosu & Hanrahan, 2021)

3.3.2 Community Water and Sanitation and Act (Act 564), 1998

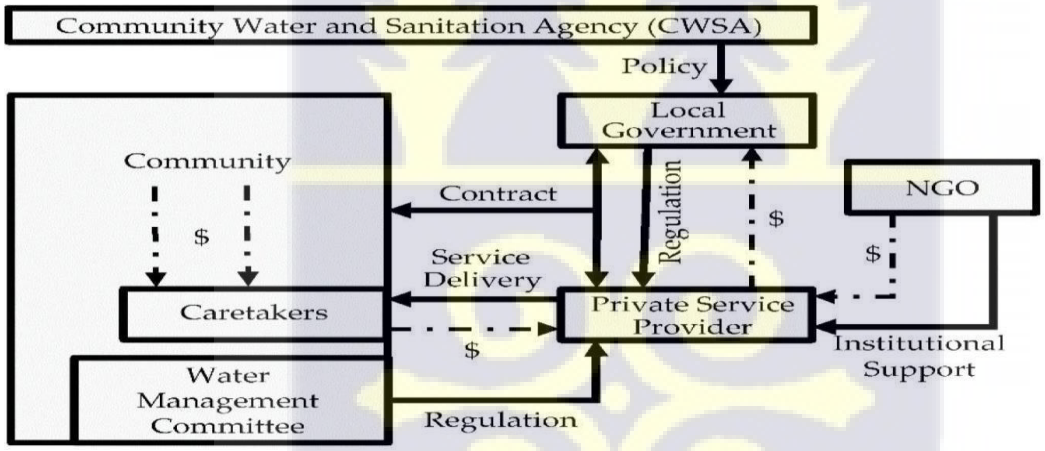
The National Community Water and Sanitation Strategy (NCWSS) established the regulatory framework for water use and management within the sub-sector of rural water supply and management system. At the community level, the strategy is anchored on provisions of the (1)

Community Water and Sanitation Agency (CWSA) Act, 1998 (Act 564); (2) Local Government Act, 1993 (Act 462), and (3) Legislative Instrument of the Community Water and Sanitation Regulations, 2011 (LI 2007). The CWSA is responsible for developing the necessary standards, key directives, and guidelines to facilitate the delivery of safe drinking water supply and sanitation services to communities. In addition to this responsibility, it is also expected to develop the necessary regulatory capacity at the local and intermediate levels to ensure district-level compliance with national-level policy directives, norms, standards, and regulations for the sustainability of services.

Notwithstanding other directives from the Ministry of Water Resources and Sanitation, the Community Water and Sanitation Agency Act (CWSA), 1998 (Act 564) stipulates that it facilitates the provision of safe potable water and related sanitation services to rural communities and small towns and also support Metropolitan, Municipal and District Assemblies MMDAs to promote sustainable use of safe drinking water supply and other related sanitation services in rural communities and small towns and create the enabling environment for MMDAs to foster community participation and women in particular in the design, construction, and end-users management in water and sanitation related services. Community Water and Sanitation Agency and MMDAs are also expected to collaborate to formulate strategies that will effective mobilises the required resources to implement safe drinking water supply and sanitation programmes, encourage the participation of private-sector involvement in water and sanitation services, and technical assistance to local managers to enable them to provide repair and managerial assistance to communities and to co-ordinate the support roles of non-state actors in the provision of water and sanitation delivery to rural communities and small towns. Since the government of Ghana split the provision of potable water into urban and rural in 1994. The

government created the Community Water and Sanitation Agency (CWSA) through an Act of Parliament in 1998, Act 564 of 1998, and CWSA became institutionalised as a completely autonomous state agency with the responsibility to facilitate the availability of safe water and sanitation delivery to rural communities. The CWSA Act is expected to promote technicalsupport services to District Assemblies and also to provide guidance in encouraging local community participation in water management and services. The target is more focused on drawing women closer to water management at the community level.

Figure 3. 2.: Institutional Framework for CWSA Operations in Water Delivery to Communities



Source: Deal and Sabatini (2020)

The main responsibility of CWSA is to spearhead resource mobilisation (human and financial) to deliver safe and hygienic drinking water to communities. The CWSA is mandated by its Act to achieve this responsibility through the promotion of private-sector participation in water services. It is also expected to coordinate non-state bodies such as NGOs, donors, and other institutional

bodies' activities in water services and collaborate with policy-making institutions that are relevant to complement potable water projects and implementation. The CWSA is not expected to work in isolation but in line with state policy directions. It is expected to work in collaboration with other state institutions such as the Water Resources Commission, Environmental Protection Agency and Ghana Water Company Limited.

3.3.3 Community Water and Sanitation Agency Regulation 2011 (LI 2007)

The Community Water and Sanitation Agency Regulations, 2011 (LI 2007) is the outcome of powers conferred on the minister of state responsible for water and sanitation under Act 564 of the CWSA 1998. It provides that a District Assembly be responsible for individuals who intend to provide water and sanitation facilities in rural communities and small towns. Under CWSA Regulations 2011 (LI 2007) all District Assemblies have the responsibility of:

• Setting up Water and Sanitation Management Team (WSMT) to manage WASH facilities for the good of all communities.

- Setting up tariffs. This is expected to be done in consultation with community members.
- The community has to ensure that tariffs are as approved by the WSMT.
- The provision of water and sanitation facilities must be by regulations under the national community water and sanitation programme as specified under state regulations on water and sanitation.

3.3.4 Local Government Act, 1993 (Act 462)

Ghana's bottom-up policymaking and implementation are undertaken underits decentralisation programme. This was legalised with the promulgation into law of the Local Government Act 2016, Act 936 at which decisions affecting local communities are taken. The

initiation of the District Assembly (DA) concept makes it the highest political and administrative decision-making body. Through the DA, social and economic decisions affecting communities are taken. All bottlenecks that serve as obstacles to progress and productivity are removed and basic infrastructure is needed for community transformation. Some known responsibilities of District Assemblies include the provision of safe, potable drinking water, community security, maintenance of public latrines/urinals, and management of solid waste among others. District Assemblies are subdivided into urban, zonal, and Unit Committees. Theyare the lowest political authorities in the District Assemblies. These committees support community mobilisation for self-initiated development projects and also monitor how self- initiated development projects are implemented. As a result of the kind of roles assigned to DAs,the CWSA has a link in the implementation of water and sanitation projects. Community Water and Sanitation Agency are specifically expected to:

"Provide support to District Assemblies to promote the sustainability of state water supply and related sanitation services in rural communities and small towns and enable the Assemblies to encourage the active involvement of the communities, especially women in the design, planning, construction, and community management of projects related to safe water supply and related sanitation services" (CWSA Act, Act 564,1998).

By this expected role from CWSA to DAs, the responsibility to provide potable water, sanitation and hygiene to communities lies in district assemblies and technical support to be provided by the Community Water and Sanitation Agency.

3.4 Major Actors in Sustainable Rural Water and Sanitation Prpgramme Implementation

3.4.1 Role of the consultant (Maford)

The role of the consultant was to do community entry by triggering the community entry process to understand the needs of the communities through a needs' assessment. After the needs' assessment was carried out, the consultant presented an inception report based on the needs of each candidate community.

The consultant embarked on sensitisation education in the communities by forming and training the Water and Sanitation Management Teams (WSMTs). The consultant does this to enhance the capacity of the WSMTs. One of the primary duties of the consultant is to assist the communities to go through the Community Led Total Sanitation (CLTS) and monitor the communities till they attain the Open Defecation Free (ODF) status. Again, the consultant trained the communities on user education on the management of the water facilities and supported the communities to make their monetary contribution to open their bank account to ensure that they adhered to the sustainability measures.

3.4.2 Role of Spare Parts Dealers

The main role of the spare part dealers was to assist the communities in finding spare parts materials to fix challenges associated with the water facilities. This was to reduce the breakdown time of the water facility after they had broken down. The preoccupation of the spare part dealers was to establish a business and stock materials that would feed the various communities with the spare parts needs to improve the reliability of the water facilities in the Nadowli Kaleo District. They were also to determine replacement parts required according to inspection of old parts, community requests, or community descriptions of malfunctions.

3.4.3 Role of Area Mechanics

Area Mechanics is trained and certified people to undertake preventive maintenance of point water systems in the Nadowli Kaleo District. They ensured routine and periodic maintenance was carried out to prolong the life span of the water facilities. Second, they make quotations on facility maintenance costs to the communities for purposes of planning and mobilisation of funds to resolve challenges in the water system. Third, area mechanics assemble hand pump parts and install hand pumps on newly constructed boreholes for use by community members. Fourth, the area mechanics report major technical problems to the District Assembly or the Water and Sanitation Management Team. Again, the area mechanics have links to Spare Parts distribution outlets to enable them to have easy access to pump parts that may be required for any repair works. Finally, the area mechanics educate and advise communities on how to raise funds for facility maintenance as well as the proper use of hand pumps.

3.4.4 Role of Rural Banks

The rural banks primarily were to assist the Water and Sanitation Management Team to improve on the saving culture of the beneficiaries' communities. They were to assist the communities in saving the money from the sale of water to have enough resources saved at the bank for preventive and routine maintenance of the water facilities. The banks also provided additional resources through loans to assist the communities to work on their water facilities in an event where the money in their account was inadequate to resolve a challenge on their water facilities.

3.4.5 Chiefs/Assembly Persons/Opinion Leaders

The role of the Chiefs, Assembly Persons, and Opinion Leaders was to provide leadership in their respective communities for smooth community engagements at the community level to ensure good governance with regards to the water facilities.

3.4.6 WATSAN Committee Members

The main responsibility of the WATSAN Committee is to manage, control, maintain, and ensure the sustainability of the WATSAN facilities. The WATSAN Committee was mandated by the bye-laws of their respective communities to operate the facilities of the committee during service hours. This would enable the populace in the respective communities to access the committee's facilities. The service hours provide accurate time as to when the service is active. This is done to avoid unnecessary delay or waste of time on the part of the patrons at the point of facilities when it is not yet time. The committee sets up and adheres to an operational plan to ensure smooth service delivery to the delight of the communities they are serving. The WATSAN Committee cleans all of its facilities at a periodic time to ensure that it is hygienic at all times. They also ensure all the facilities under their management are functioning properly to foster improved service delivery to the community.

The second function performed by the Water and Sanitation committees in the Nadowli- Kaleo District was the maintenance of its facilities. The committee does this by setting up a maintenance plan to ensure regular servicing and or overhaul of the facilities at all times. It includes but is not limited to changing fittings and repairing any broken-down facility. The

commonest repair work is fixing hand pump-fitted boreholes whenever they are broken down to ensure smooth service delivery.

Another crucial function performed by the Water and Sanitation Committee in the District was to control the facilities or assets under their management. The control function ensured that there were adequate check-ups according to the designed checklist of the committee. The control purposes were necessary to ensure that personnel deployed by the committee to the man the facilities were working to their optimum. The control function addressed issues of absenteeism on the part of personnel manning the facilities of the committee.

Sustainability of the water and sanitation facilities was another function performed bythe WATSAN Committee. The WATSAN Committee cooperated with the local authorities and other stakeholders to sustain and extend the life of water and sanitation facilities. They also mobilise community members to participate in water and sanitation activities. They do this by identifying issues that require immediate action to address them. The committee maintains frequent communication with the community members to inform and bring them up to speed with the happenings of the committee and also provide a platform to express their concerns. The committee also resolves the problems related to water and sanitation activities and facilities.

3.5 Essential Elements of the Regulatory Framework on Institutional Performance

3.5.1 Legal Framework and Implications

The legal provisions on rural water delivery are clear for CWSA to facilitate the availability of safe water to all communities. This includes giving DAs technical support to deliver on their mandate. The CWSA needs to have the requisite number of specialists in the field to implement this portion of the mandate. However, there are huge financial implications for funding. An aspect

of technical support by CWSA to DAs and end-user communities is the ability to provide training. This is not easy to implement after the withdrawal of project funding, mostly provided by donors and NGOs in rural water delivery. Communities that wish to benefit from CWSA DAs support are in their thousands. This is a burden on local authorities to meet targets set in the Medium-Term Development Plan. For instance, training community members in best water management practices requires the provision of record books, pens and paper. Theseare not easily within reach of local institutions in rural water delivery.

In the case of borehole water supply, the role of the CWSA mandate to set up tariffsis problematic as the community's willingness to pay becomes a bottleneck to successful water projects. Communities are certainly not homogenous and as such, tariff levels (Deal & Sabatini, 2020) and agreed criteria in payments vary from one community to another. The literature gives justification for DAs to provide water, sanitation, solid waste, and infrastructure, which are the responsibility of the District Assemblies because they have been structured to be closer to the people. However, DAs still feel undermined by the top-down policy approach imposition such as contract award processing, selection of drilling contractors, and poor borehole installation.

3.5.2 Institutional Framework and Implications for Policy Reforms

The literature on rural community-managed water supply asserts its outcomes are based on how institutions at the community level of government operate. Availability of financial resources to DAs' CWSA and Regional Co-ordinating Council are scarce. The offices of CWSA are only located in the regional capitals of regional administrative headquarters. For instance, training community members in best water management practices requires the provision of recordbooks, pens and paper. Its income generated is inadequate to support widespread intervention to

enhance the provision of clean, safe, and potable drinking water in rural areas. Even with WSMTs support as per their mandate to encourage the setting of tariffs and collection, they are still confronted with the challenge of water users' refusal to pay for tariffs, poor bank system, and bookkeeping records, and low support and motivation from external water providers, link break between WSMTs and end-user community management members and lack of funds to train an end-user member in borehole repair and maintenance (Samuel et al., 2019).

3.5.3 Financial Framework and Implications

Water and Sanitation Management Teams as recognized by CWSA Act, 1998 (Act 564) stipulate that financial management of rural water systems be subject to bye-laws of the Community Water and Sanitation Agency. Regulations and bye-laws set by the Ministry of Local Government, Decentralisation, and Rural Development request that WSMTs operate three accounts:

- Operational account isn't exceeding 70% of net revenue to be expended to cover the cost associated with water production, operation, and maintenance.
- The capital accounts for not less than 20% of revenue generated by the community for water system extension and Sanitation accounts for not less than 10% of all revenue accruing to the community to be used to provide community sanitation and environmental safety (Kumasi et al., 2013).

The difficulty of community management of finances generated by community members is a system failure where tariffs/fees design fail to conform to local needs, response, and livelihood. This is where WSMT's collaborative effort to improve revenue generation is important to finance operation and maintenance. Preventive maintenance is reported as key to community assets management including general inspection, replacement of broken-down parts, and

coordinating, reporting, and processing of information. With the process of information, key indicators of system performance are tracked and stored. Training for community members to design, set, and collect their tariffs for operation and maintenance.

3.6 Conclusion

Chapter three broadly dealt with the Rural Water Management concept and institutional/regulatory framework that set out Ghana's rural water sector. Generally, the review of related literature revealed the various approaches or roles played by the private, public sector, and community members in the entire community water provision and management, and sustainable PCS. Ghana's Community Water and Sanitation Agency is one of the foremost entities that set up standards, regulations, and guidelines in rural water delivery. In the Nadowli-Kaleo District, it was clear that the institutions responsible (CWSA) are not present to effect changes at the community level. The local government system representative is present but incapacitated to deliver their mandate. Lessons learned included but were not limited to the need to involve the communities in the Rural Water Management (RWM) chain to create a comprehensive demand-driven system for the sustainability of the community water supply networks in developing countries like Ghana.

CHAPTER FOUR
RESEARCH FRAMEWORK AND METHODOLOGY

4.1 Introduction

The chapter describes the study area and the philosophical assumptions that support the study. This includes the research methods used, strategy, and adopted philosophical paradigms. Critical in every social Research approach is its effectiveness in increasing validity (Daengbuppha et al., 2006). Accordingly, efforts were made to include how validity was achieved in this study.

4.2 Study Area

A Legislative Instrument (LI 2101) established the Nadowli-Kaleo District Assembly (NKDA) from the then-Nadowli District Assembly in June 2012. Ghana's Local Government Law 1988 (PNDC Law 207) established District Assemblies as the highest political and administrative entities with the sole responsibility of facilitating the implementation of national policies at the lower levels of governance. The NKDA is composed of a District Chief Executive, a Member of Parliament, and 51 Assembly Members elected from 51 Electoral Areas. This was relevant for understanding the local government institutional structure for facilitating formal sector interventions in community-level water and sanitation management. The location and size, as well as other relevant characteristics that influenced the choice of methodological procedures, such as household characteristics and sources of water, have been discussed in the ensuing sub-sections.

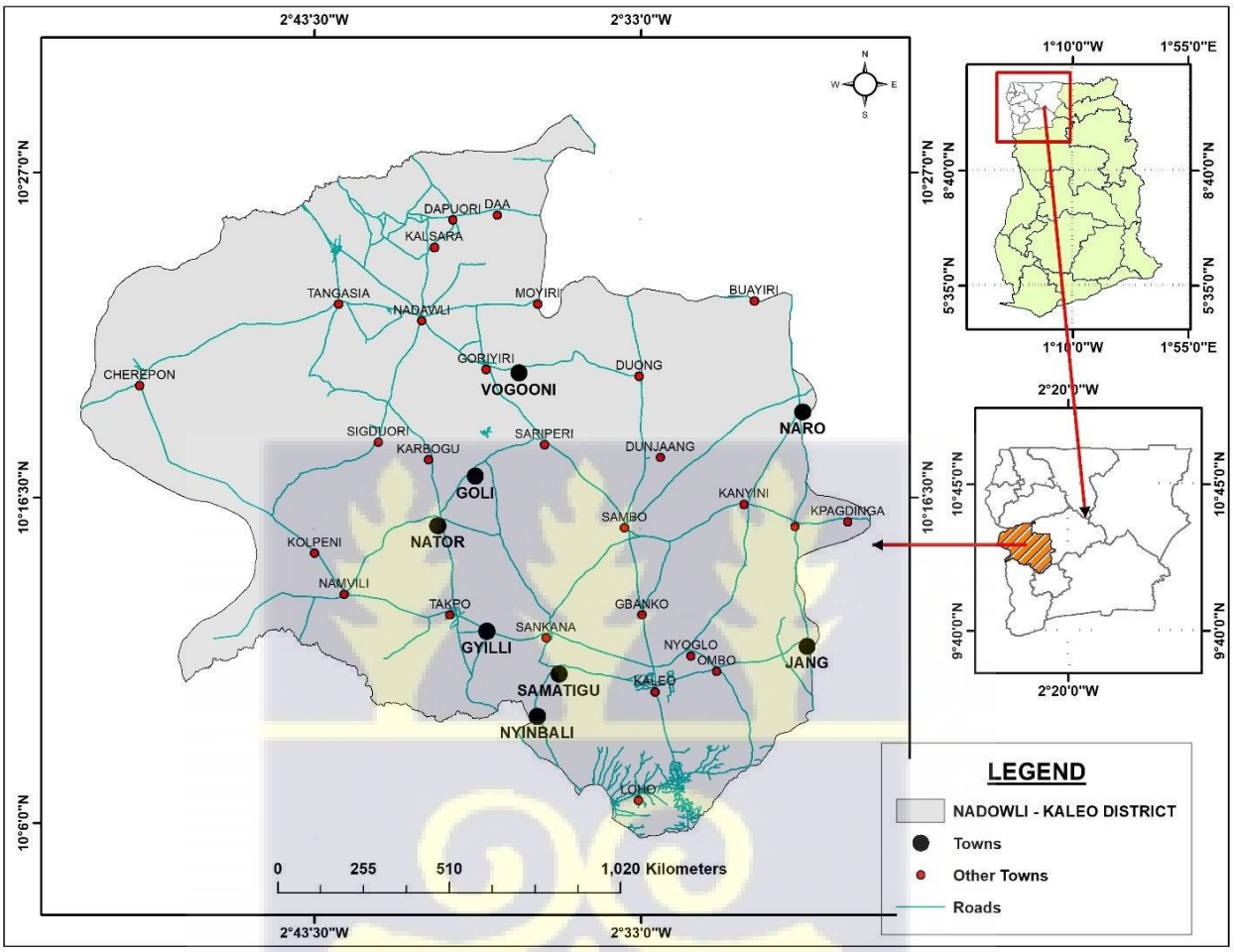
4.2.1 Location and Size

Specifically, the NKDA lies between latitude 11" 30" and 10"20" north and longitude 3"10" west

(Figure 4.1). It is bordered to the south by Wa Municipality, west by Burkina Faso, and north by Jirapa District. It covers a total land area of 2,742.50 km2 and extends from the Billi Bridge (4 km from Wa) to the Dapuori Bridge (almost 12km from Jirapa) on the main Wa- Jirapa Hamile road. To the west and the east, it is bordered by Sissala West and Sissala East Districts respectively.

Figure 4. 1: Map of Ghana of Nadowli-Kaleo District Connected by Road in Green Colour

Map of Study Area



Source: Dept of Geography, University of Ghana, Legon, 2023

The capital town of the NKD is Nadowli, located about 40 kilometers from the regional capital town of the Upper West Region, Wa. The location of the district promotes international trade between the district and neighbouring Burkina Faso as shown on the district map. The nodal nature of the district attracts population from the neighbouring areas, which leads to rapid population

growth, thus, mounting pressure on water and other social amenities. Also indicated on the map in Figure 4.1 are major communities where SRWSP-constructed boreholes are located. Some of the beneficiary communities are Gili, Nyimbali, Yiziri, Naro, Cherikpong, Takpo, Sankana, and Goli, which have applied for consideration and have been selected for this study because the location of the water infrastructure was a required factor for this study.

4.2.2 Demographic Characteristics

According to the 2020 population census, the district had a total population of 77,057 with a growth rate of 2.1%, out of which 35,205 are males and 38,619 are females (GSS, 2020). Going by the national standard of 5,000 people for the definition of an urban settlement, none of the settlements in the Nadowli-Kaleo District Assembly has attained an urban status. Only 15 out of the 18 major settlements have populations above 2,000. The household population is 73,824. It is estimated that 85% and 70.9% are categorised as poor (GSS, 2020).

In terms of household characteristics, the traditional household structure in Nadowli is headed by males. Household numbers are large mainly as a result of the extended family system. It is also estimated that the average household size of the NKD is 6.2 persons. Household heads constitute 16.7% (GSS, 2020). A head of a household is a person who has an economic and social responsibility for the well-being of household members (GSS, 2020). The total household population is 73, 824 with 35,205 males and 38,619 females.

4.2.3 Relief, Drainage and Geology

The topography of the district is low-lying and undulating at altitudes ranging between 150m-300m above sea level although some parts average 600m. The only major stream, Bakpong, and several ephemeral streams flow into the Black Volta. These rivers and streams coupled with dams

and dugouts are used seriously for dry-season farming. The district geologically has three types of rocks, namely the basement complex, birimian, and granite. These rocks are rich and contain properties that can produce high quantities of water if a deep well is drilled for borehole construction. There is also a large deposit of precious minerals in the district that attracts mining companies to invest in the district. The soil types in the study area are sandy, laterite, and sandy loam which are poor in organic matter and as such not suitable for food crop cultivation except in the eastern part around Jang where the soil is suitable for the cultivation of rice, legumes, cereals and yam.

4.2.4 Main Source of Drinking Water

Wells and boreholes fitted with hand pumps are the main sources of drinking water for domestic use. The percentage that depends on boreholes for drinking water and other domestic uses is 76.7% while less than 0.1% use rainwater and other sources of water supply for domestic use in the district. The district has a total of 240 boreholes located in 168 communities. Out of this number, only 119 are functional, and the remaining 121 is dysfunctional and need some kind of support for rehabilitation. Although the construction of new boreholes has increased the number by 30%, water coverage is still low as a result of the constant breakdown of boreholes (District Water and Sanitation Programme, NKDA, 2020).

On sanitation, 77.6% of households have no access to toilet facilities, depending largely on open defaecation, and only 9.9 % of households have access to public toilet facilities. The low coverage and high level of breakdown of water points are the motivating factors that drove the focus of this research into exploring the application of the demand-driven CBM model inthe Nadowli-Kaleo District Assembly.

4.3 Research Philosophy – Pragmatism

This study is grounded in the philosophical paradigm of pragmatism as the epistemological basis of measuring truth or reality. The pragmatic philosophical paradigm allows the hybridisation of views, theoretical framework, conceptual framework, and research designs (Creswell, 2007; Johnson & Onwuegbuzie, 2007). Pragmatism is a philosophical paradigm that posits that realities are varied (Yazan & De Vasconcelos, 2016). Pragmatist social science researchers think that actions cannot be separated from situations and context and are connected to social consequences and change. Pragmatism recommends mixed research methods. This informed the choice of the mixed research design for this study as a catalyst that enhances a detailed understanding of the research questions contained in any social research.

Using a mixed research design involves the application of quantitative and qualitative approaches, which have been explained in the section on research design. These mixed approaches informed the adoption of epistemological positions of both objective and subjective realities. The objective reality is in line with the positivist conceptualisation of knowledge as that which can be experimented with and is measurable. The subjective reality, on the other hand, is about seeing truth based on the subconscious or intuitive expressions of the mind. Pragmatism and its mixed research approaches and philosophical positions were applied in this study to guide the exploration of the demand-driven CBM model in rural water service delivery in the Nadowli-Kaleo District.

The philosophical perspectives of the researcher were very important in many aspects They supported the researcher to make distinctive clarifications on the research design including the kind of evidence to be gathered and how this evidence was interpreted. Secondly, a philosophical

perspective also assisted the researcher to determine the kind of research design that will work and the others that will not work in the design(Al-Ababneh, 2020).

4. 4 Sequential Mixed Methods Research Design

The mixed research method is a "procedure for collecting analyzing, and mixing or integrating both quantitative and qualitative data at some stage of the research process within a single study for the purpose of gaining a better understanding of the research problem. According to (Fetters et al., 2013; Tashakkori & Creswell, 2007). The rationale for using mixed methods is to enable the researcher to capture details of a study situation when no single method (quantitative or qualitative) is insufficient to provide enough data. These will allow for a robust analysis when the research leverages the advantages and strengths of each method.

A mixed-methods sequential explanatory research design is in two main phases. This design consists of the quantitative and followed by the qualitative phase. In the mixed-methods sequential explanatory research design, data is collected and analysed to produce inferential statistical data. This is followed by data collected to produce themes in the qualitative phase. The text (themes) generated in the qualitative phase help to explain and elaborate more on the quantitative data. The strength of mixed methods is its opportunity to explore in detail results in quantitative data (Othman et al., 2021; Poth, 2022). The core of mixed methods is the integration of data to achieve "a form of synergy that results in a better understanding of a phenomenon" in social science research.

This study adopted an explanatory sequential mixed method approach (quantitative and qualitative data) to investigate a single case study. With this approach, quantitative data findings served as the foundation (Abu & Toyon, 2021; Draucker et al., 2020) to produce descriptive and inferential

statistics to develop qualitative tools for data collection. The combination of quantitative and qualitative data allows for multiple data collections. It also enables data to be amalgamated and thematic views emerged to support the multiple data triangulations in theanalysis phase of this study.

During qualitative data collection using unstructured, open-ended interview guide, the experiences of participants relating to their lived social relations are matched with their own subjective interpretations relating to their interaction with water users, actors, and institutions. During exploratory interviews and interactions with individuals and focus group discussions, social phenomena are tacitly revealed. In this study, qualitative data were used to explain quantitative data to enhance its validity and reliability in the quantitative phase (Johnson & Onwuegbuzie, 2007; Yazan & De Vasconcelos, 2016). A major strength of MMR is the ability of the researcher to use the weakness of a method to counterbalance the strengths of an alternative method (Jogulu & Pansiri, 2011). The sequential mixed method research allowed for a concurrent triangulation of data. This approach has the advantage of reducing time use, flexibility and opportunity to learn from the application of quantitative and qualitative methods.

4.4.1 Data Collection Sources and Procedure

Research data is any information that is collected, observed, generated, or created to support or validate findings. Diverse information was required which caused the study to employ several data collection methods. Fieldwork in communities with SRWSP installed boreholes among households, WATSAN Committees, caretakers, village leaders, women, and other State and private-sector participants in the water supply sector. Other stakeholders such as actors and institutions in water supply and management were contacted and interviewed. Some secondary

data used in this study are census results (Population and Housing Census), board minutes, government policy documents, government legislative instruments, research findings by donor institutions etcetera. The source of quantitative data was the use of structured questionnaires, while the sources of qualitative were the use of in-depth interviews, source point observation of end-users fetching water, key informant interviews, and focus group discussion.

4.4.2 Techniques, Sample Size Determination

The study relied largely on purposive techniques to select sampling units and respondents for interview. For accurate information on population size, and household, the study relied on the Ghana Statistical Service (GSS) Population and Housing Census records since 2020. This necessitated the use of purposive sampling (nonprobability sampling) method to collect data on WATSAN committees, women, communities, village leaders, caretakers, and water users in water management in the study area. The study did not include communitieswith handpump water supply except in areas installed with SRWSP boreholes. In communities where there are more than one borehole and there are all working, stratified sampling methods used to identify members of the community and end-users of the community that fetch water fromthe SRWSP installed borehole. The method, instruments and sample size is shown in Table 4.2 above.

Table 4.2: Integrated Sample Method, Instruments, and Sample Size

Method	Instrument (s)	Participant (s)	Types of Sample (random/non-random)	Level (s)	Sample Size
Survey	Questionnaire	WATSAN Committee	purposive	Community	210/138
	Questionnaire	Household heads/spouse	purposive	household	2.515/345
	Questionnaire	Caretaker/attendant	purposive	Source point	One (1) out of two in each selected community
Focus Group Discussion	Semi-Structured Interview Guide	Community Leaders	purposive	village	One (1) in each selected community
	Semi-Structured Interview Guide	Community Women Focus Group	purposive	village	One (1) in each selected community
Key Informant	Semi-Structured Interview Guide	Chief Extension Services Specialist (ESS). CWSA	purposive	national/regional	Two (2) persons
	Semi-Structured Interview Guide	District Water & Sanitation Coordinator	purposive	district	One (2) person

Interview (KII)	Semi-Structured Interview Guide	Water Vision Technology Ltd	purposive	regional	One (1) person
	Semi-Structured Interview Guide	MAFORD (Partner Organization)/Consultant	purposive	field	One (1) person
Observation	Participant/qualitative using field notes & audio recording	Water end-users	Stratified sampling	Source point	Saturation
Document Review	Documents	Agency/academic	purposive	Board minutes of project implementers, annual reports, programme manuals etc.	Saturation

Source: Author's Own Construct , June 2022

4.4.3 Methods and Techniques used in Data Collection Process

In this study, the study population includes communities with boreholes fitted with hand pumps under the UWR-SRWSP programme. The sampling units were household heads (male/female) that depend on these boreholes for water use. All respondents were people who were 18 years or above. This was to ensure that reasonable responses were given by mature people who qualify to make decisions independently. Snowball sampling method was used to identify and interview WATSAN committee members, caretakers/attendants who care for boreholes at the source points, opinion leaders, community women who draw water from UWR-SRWSP drilled boreholes in NKD. In respect of actors and institutions in community water management, purposive sampling was used to gain entry to their outfit. Some of the actors and institutions are the Community Water and Sanitation Agency (CWSA) officers in Wa, the District Water and Sanitation Coordinator in NKD, Water Vision Technology Limited, MAFORD consultants who were contracted to design UWR-SRWSP on behalf of CWSA and CWSA reports on rural water supply in the Nadowli-Kaleo District.

The study measured CBM project sustainability (dependent variable) at the community level in five (5) ways namely; Community-level pre-construction and project implementation factors; (e.g., demand responsiveness, degree of women involvement in project planning); technical support system by actors and institutions (e.g., water system management regime, kind of externalsupport from partners); Community-level borehole characteristics (e.g., financial management, cost recovery system, age of the borehole since installation, choice of technology); Community- level Institutions support systems (e.g., capacity, transparency, composition of membership, functions); and HH characteristics (e.g., mean HH expenditure, percentage of HH who trust villageleaders).

This is represented statistically as:

Sustainability (S) (dependent variable) of CBM rural water supply:

Sí = f(Preí, Postí, Watsaní, HHí, Techí, Instí)

Where…

• Sí = Sustainability of CBM water system in the íth village is determined by the following (independent) variables:

• Preí = Village-level pre-construction factors

• Postí = post-construction factors (availability of attendants, mechanic, kind of operations and monitoring received)

• Watsan = characteristics of water and sanitation committee in village (% women participation, mechanic, and attendant availability)

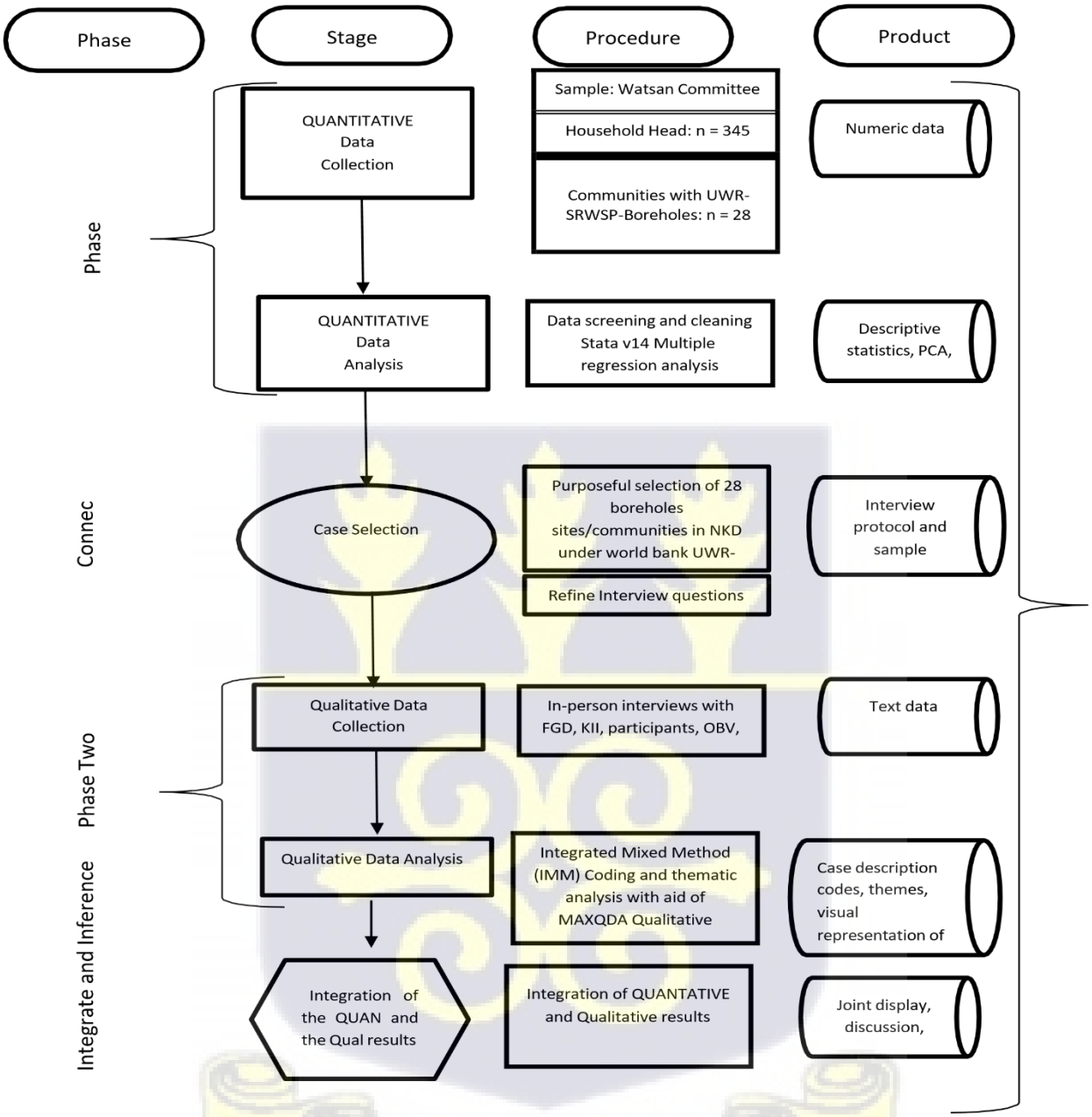
• HHí = aggregate measures of household characteristics (mean HHs expenditure, % HHs that see transparency and accountability in their leaders.)

• Techí, = Technical support availability for day-to-day running of service (actors capacity,

• financial empowerment, Watsan committee bookkeeping)

• Instí, = relations between institutions and collective output (actors' capacity, end-user training, private sector involvement, enforcement of bye-laws, implementation of regulation).

Figure 4. 2 Data Collection Procedure for both Primary and Secondary Data



Source: Creswell et al., 2007 and Modified by Author

4.4.4 Instrument of Quantitative Data Collection- Structured Questionnaire

A structured questionnaire was constructed and used to collect data from household heads sampled for the study. It was divided survey was categorised into four sections. The first section was about the socio-demographic characteristics of respondents. The other three sections are based on the first three objectives of this study namely the demand-driven post-construction support approach on community-based water management sustainability; the effectiveness of end-users of water supply systems and the impact of technical support (PCS) provided by actors; and the extent of institutional arrangements and linkages that support Rural Water Management (RWM). The questionnaire for WATSAN Committee was categorised into five sections, namely: committee membership and organisation; relations with the community in the post-construction phase; responsibilities of the WATSAN Committee; training and external support for the WATSAN Committee, and tariffs, fees, and collection methods. All questionnaires were structured with close-ended questions.

4.5 Qualitative Data Collection Methods

4.5.1 Focus Group Discussion

In all focus group discussions were conducted with women in communities who draw water from SRWSP boreholes or in each of the communities where the IDA-World Bank borehole was constructed. All persons who draw water from the IDA – World Bank boreholes are qualified to participate in the discussions except if the individual is an area mechanic living in the community, a member of the WATSAN Committee, or a bank account keeper. This was intended to avoid conflict of interest or any other form of domineering posture during discussions.

Focus group discussion (FGD) was used to solicit information using open-ended, unstructured

interview guide which proved useful with women who fetch water from boreholes under study and WATSAN committee members. Questions asked during FGD sought to know the scope, function, and responsibilities of community members in the operation and maintenance of boreholes, gender inclusiveness/exclusiveness in decision-making, funds mobilisation for operation and maintenance, effectiveness, and performance of WATSAN committees, and their knowledge and skills levels in borehole repairs. It also elicits from respondents the form of external technical, administrative, and financial assistance received by communities. Information was also collected on opinions on tariff structure, frequency of hand-pump breakdown, cleanliness of borehole environment and the level of support from local government authorities. Women were also asked about their degree of satisfaction with the water borehole water supply. (Mishra, 2016)sees FGD as "a form of group interviewing in which a small group - usually 10 to 12 people is ledby a moderator (interviewer) in a loosely structured discussion of various topics of interest." Critical in all focus group discussions are the transcripts that are produced at the end of it. One common characteristic associated with FGD is the homogeneity of the participation with respect to age, sex, common interest, and location. Focus group discussion generates qualitative data at the end of the interview. Further questions are allowed to broaden the scope of discussion relatingto the research area. Focus group discussion allows a study to explore topics and enables me the opportunity to collect data from the group interaction. In the end, the discussion generated different feelings, experiences, attitudes, consensus, and disagreements among borehole water users whichthe study couldn't have obtained in the household survey and with other methods such as household questionnaires.

4.5.2 Key Informant Interview

Key informant interview (KII) involving four CWSA senior staff, NKD Senior Officer, and other key staff of government institutions, Non-Governmental Organizations (NGOs), civil-society organizations, and other actors from the private sector. In Table 4.1 below, the names of key informants, organisations, and positions are indicated. The purpose of selecting these individuals for interviewing is because of their insights, ideas, knowledge, and experience in ruralwater supply in the Nadowli-Kaleo District. Specific information on their role and support to communities to strengthen SRWSP in NKD was asked on a particular subject under study. Key informant interviews allowed me to respond to questions covering a wide range of issues. Respondents are knowledgeable in the complexities and dynamics of Community-Based Management in the Nadowli-Kaleo District. The study concentrated more on public servants in the Nadowli-Kaleo District, technical support staff, NGOs, and Community-Based Organizations. During the KII interview session, a digital audio recording was used as well as note-taking. Theserecordings were later listened to repeatedly and salient points were written down. Points that required follow-up for further clarification were done using phone calls to the respective participants.

Table 4.3: Table showing Key Informant Interviewees interviewed in and outside the Study Area

Position	Organization
Assistant Director (Admin)	NKDA
Coordinating Director	NKDA
Water & Sanitation Officer	NKDA
Chief ECC	CWSA
Project Manager	ProNet North
PO/Consultant	Maalu Foundation for Rural Development (MAFORD)
Regional Director	Water Vision Technology Ltd Wa
Field Supervisor	Water Vision Technology Ltd Wa

Source: Authors Own Construct 2021

4.5.3 Observation Guide Used at Borehole Sites

Observation for this study was mainly at the source point of end-users fetching water and other activities at the borehole site. A simplified matrix was constructed for end-users fetching water at the source point. It was rather able to observe interactions at source points of water facilities. The study was interested in observing the number of 'water fetchers' at each source point at a particular time, end users composition, women, men, children, school children, people living with disabilities, number of strokes that took water to flow out, number of minutes it took to fill a basin, how payment for water fetched is done, and number of minutes spent at each borehole site before

fetching water, and the level of cordiality among them. Also observed was the sound of the borehole handle, the nature of disagreements amongst water users, cleanliness and protectionof borehole site, alternative sources of water, distance from homes to borehole source point and effectiveness of the caretaker or attendants. This solicited information was either tallied or jotted into the matrix sheet and the field notebook.

4.6 Data Collection Process/Procedure

4.6.1. Questionnaire Design and Piloting of Questionnaire

The study reviewed the several times to fit into the study area and also to meet the research objectives. After reviewing the questionnaire, a final one was programmed into a Computer Assisting Programme Interviewing (CAPI) using Open Data Kit (ODK).

This is computer software used to make data collection easier and faster. Piloting of the questionnaire took place in Vogooni, Yiziri, Kpazie Muglu, Dapuori, and Kulaayiri. A sample size of 21 WATSAN Committee members and 30 households was used.

4.6.2. Data Collection and Training of Field Enumerators

The study collected extensive data from households and WATSAN committee members from all communities that benefitted from the IDA-World Bank SRWSP boreholes. The possibility of following a rigorous random sampling protocol to select household heads/spouses was a challenge in February 2022. Provisional or final data from the 2020 Population and Housing Census for the NKD were not yet available. The study relied on data on household heads/spouses during the pilot phase of this work.

It was similar to the selection of the WATSAN committee focus group discussion.

In all 28 WATSAN focus group discussions took place. In the IDA-World Bank SRWSP implementation protocol, 10 people constituted a WATSAN committee. Field enumerators obtained information relating to the committee's scope of work, functions, and responsibilities and whether there have been any significant reforms after the project planning and implementation phases such as structure, and membership. Other information obtained was in relation to the WATSAN Committee's linkage with the wider community membership, external support in terms of finance, administration, skills training, spare parts availability, and access to mechanics.Another focus group survey included community leaders, opinion leaders, chiefs, and borehole attendants. This aspect of the study included obtaining information on community participation inproject planning, project implementation, frequency in attending meetings, frequency in the breakdown of the borehole, willingness to pay tariffs for borehole use, and cost associated with operations and management of the borehole. Women surveyed in this category provided information relating to the safety of monies contributed towards operation and maintenance, gender relations in respect of O & M, and the burden of obtaining water from far away sources asa result of the non-functioning borehole.

Enumerators were carefully selected based on their field data collection experience, fluency in the local language widely spoken in the study area (Wali and Dagaari), experience in the use of Android applications for data collection, and understanding of the questionnaire. The enumerators were given two training on the use of ODK computer software, field data collection protocols (data protection, data privacy), and translating of the questionnaire from English to the local language (Wali and Dagaari), after which there was a field practice of the tool to identify all challenges of the tool and set standards to get the quality and accurate data from the field.

4.6.3 Data Protection

Enumerators were also taken through data protection and privacy protocol to help them understand

the need to protect the data. The ODK application was designed with security features to prevent non-enumerators from having access to the data. Enumerators after finalising the data were prevented from having access to the data on the ODK application and ODK server. Every enumerator submitted their data to the server after data collection in the field each day. This was backed up by the data manager to prevent data loss.

4.6.3 Data Cleaning

After each day of data collection in the field, enumerators were followed up by the data manager to submit all field data. A data quality check was prepared using Stata 15 do-file to identify and flag issues that need to be addressed by enumerators for data quality purposes. The data manager backup, the row data each day and writes, a Stata do-file to fix the addressed issues by enumerators, all the data files were encrypted and saved in three different locations namely, computer partitioned hard drive space, external hard drive, and cloud (google drive).

4.6.4 Document Review and Analysis

Secondary data are data empirically gathered by researchers, institutions, and international funding organisations on a project where research was conducted. It could be the outcomes of monitoring and evaluation of a project. The outcome of such research or reports constitutes secondary data that is preserved for future reference. The documents formed part of the documentreview and analysis session of this study. Materials for this review were both textual and close categorisation of the subject's matter and statements.

Documents reviewed were widely dealing with subject matters on organisational and institutional documents that deal with records of the state and non-state actors engaged in rural water delivery. This study undertook a content analysis of rural water projects in Ghana, dissertations on water

supply sustainability, and annual reports of state organisations and international agencies on water/sanitation such as the CWSA, MSWR, Ghana Population and Housing Census (2022), World Bank, UNICEF, DANIDA, and Catholic Relief Services. Content analysis was done qualitatively to support or reject the finding in the results and analysis chapter of this study.

4.7 Methods of Data Analysis

4.7.1 Integrated Mixed Method Data Analysis

Thematic analysis provides an avenue for organizing and eliciting meaning and drawing conclusions after careful data collection. Qualitative data collection and analysis see integration as the merging of analysis and interpretation and often by the merging of data collection with data analysis (Cohen et al., 2017). In conclusion, he sees thematic analysis as a distinctive tool. Thematic analysis became popular with most social science researchers with its advantage of allowing large data collected to be analysed using patterns and developing themes to conclude.

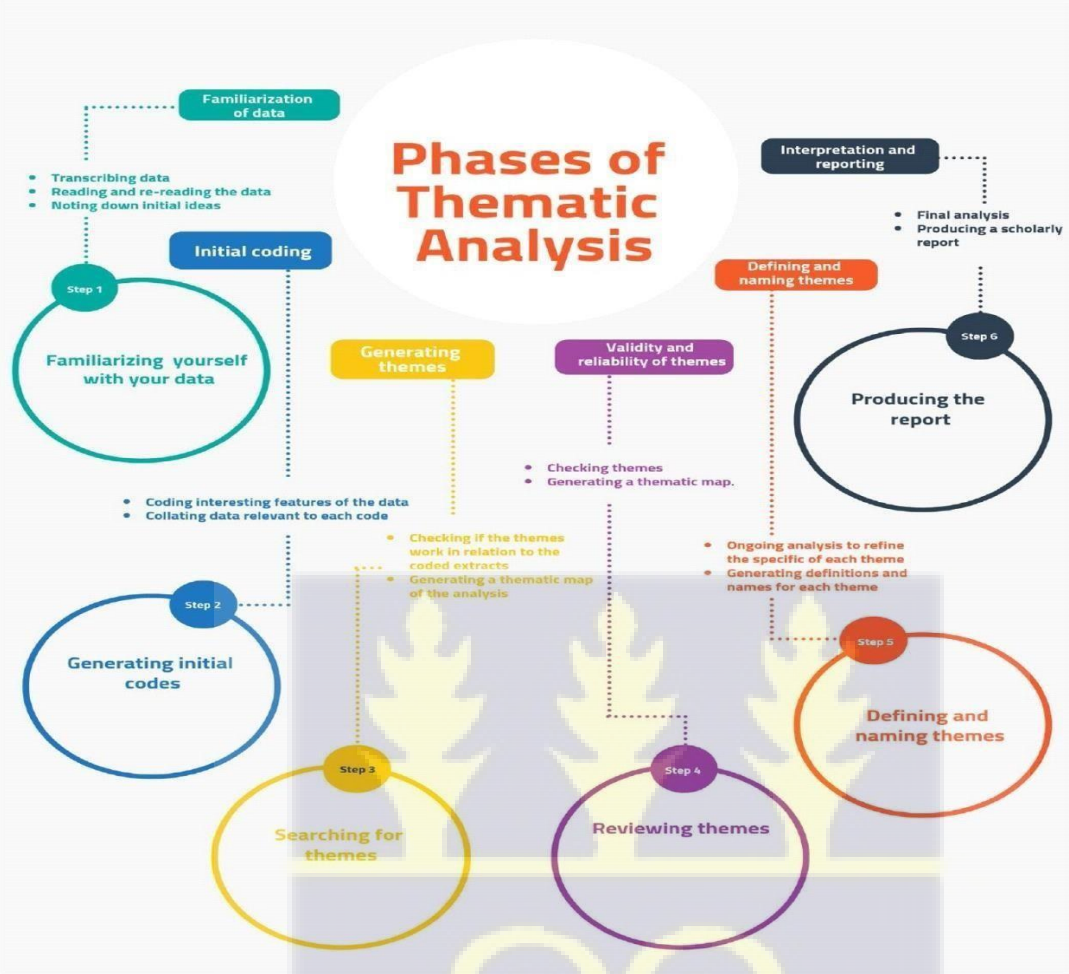
4.7.2 Thematic Analysis of Qualitative Data

Thematic analysis is described as a data set analysis that involves "a method of identifying, analysing, and reporting patterns or themes within the data" (Braun & Clarke, 2006, p.63). It is not merely just identifying and analysing but also moves beyond counting explicit words or phrases and focuses on identifying and describing both implicit and explicit ideas. Codes developed for ideas or themes are applied or linked to raw data as summary makers for later analysis, which may include comparing the relative frequencies of themes or topics with a data set, looking for code co-occurrence, or graphically displaying code relationships (Guest et al., 2014). In surveys, key informant interviews, or focus group interview sessions, an interviewer is said to be "immersed" in raw data after being overwhelmed with a large quantity of data. Various approaches have been

proposed to conduct thematic analysis. In the proposed Six-Step process that enables a researcher to identify and attend to very important areas in thematic analysis the researcher to know the approaches and learn how to do thematic analysis.

This study adopts (Braun & Clarke, 2006) six step-by-step processes as a guide to thematic analysis in participants' responses to questions regarding their participation, knowledge, and experiences in borehole water use and supply in the Nadowli-Kaleo District. (F. G. Castro et al.,2010) summarises the six phases as can be seen in Figure 4.4 below as data familiarisation, generating codes and coding, generating themes, reviewing potential themes, defining and namingthemes, and writing up the thesis. The process of presenting results is referred to by (F. G. Castroet al., 2010) as an integrated mixed-method thematic analysis.

Figure 4. 3: Showing the Various Phases of a Thematic Analysis in Qualitative Data



Source: Thematic Analysis of Qualitative Data adapted from Braun and Clarke (2006, p.87)

4.8 Quality Assurance and Consent of Participants

To increase the validity of my findings, the study utilises different procedures. According to (Fetters et al., 2013)C, a combination of "multi- or polyvocal discourses" exists as verification procedures to support data quality and trustworthiness. This made the study understand knowledge in terms of information elicited from participants. Different terms are used to connote validation.

These are internal validity, confirmability, consensual validity, paralogical validity, explicitness, and credibility (Tracy, 2010). Quality assurance procedures included:

• The viewpoint of participants presented devoid of the researcher's meanings and

• interpretations,

• Participants were used as the jury to authenticate data.

• Conducted member checks with participants via mobile phone devices such as WhatsApp and text messages to clear discrepancies in data.

"Bracket" assumptions of the researcher (myself) such as biases and prejudices.

The study sought the consent of participants in the research. Consent forms were read in English and interpreted by all participants before administering the questionnaire in a survey. The information contained in the consent form would include the researcher's identity, the benefits and risks associated with the study, commitment to confidentiality and proof to participants of the right to voluntarily withdraw from the study if they wished to do so at any time. The assurance to participants of our readiness to destroy every data provided if they withdrew from the study was given. As a requirement by the Ethics Committee for Humanities (ECH) of the University of Ghana, additional contact information sources were provided for participants to make further enquiries if they wished about the researcher and the subject under study.

4.9 Ethical Consideration

Research ethics is being about creating a mutually respectful, win-win relationship in which participants are pleased to respond candidly, valid results are obtained, and the community considers the conclusions constructive. In his famous work titled, "In Remembrance, There Is Prevention: A Brief Review of Historical Failures to Protect Human

Subjects," (Nelson, 2012) argues the relevance of ethics from a historical perspective as he presents major case studies about the formulation of codes, ethical principles and then related these case This study relied on five important ethical principles to guide it. These are:

• Participation in this study informed that their participation was voluntary.

• Participants in FGD are informed of the purpose, methods, risks, benefits, and the intended possible use of data to be collected.

• Participants were informed about their right to refuse or redraw from a focus group discussion at any point or refuse to answer any question asked by an investigator. The participants were also informed of their right to ask any question before, or after an interview or an FGD.

• Participants were assured of confidentiality and privacy was protected in final reports and dissemination of the report.

4.10 Conclusion

This chapter provided a detailed description of research methods, research design, and process in data management and analysis. The chapter also presented the study area, philosophical assumptions, and unit of analysis. The methodology of the study included the sample size, sampling procedure, and instruments used for both quantitative and qualitative data. Data processing procedure and data analysis were presented with particular attention paid to integrated thematic data analysis. It concluded with the process of data triangulation, quality assurance procedure, participants' consent protocols, and the ethical concerns under consideration in the study.

CHAPTER FIVE

SKILLS, CAPACITY, OPERATION, AND MAINTENANCE UNDER SUSTAINABLE RURAL WATER AND SANITATION PROJECT

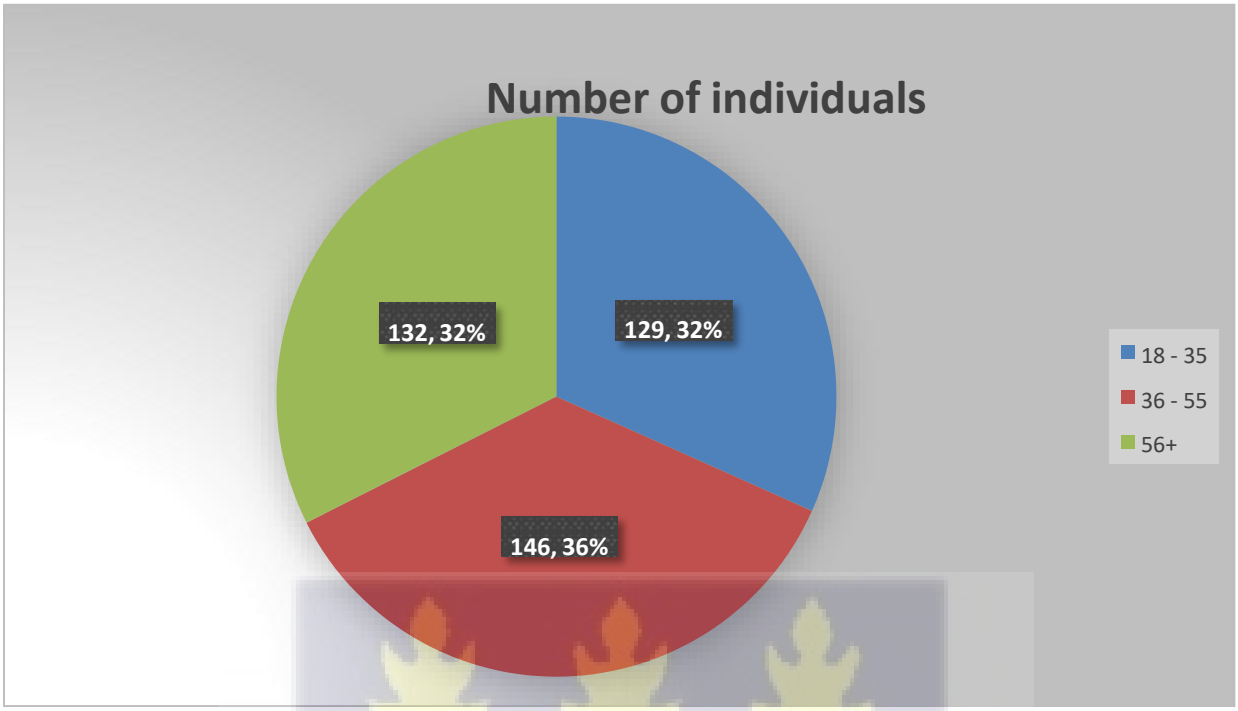
5.1 Introduction

Chapter five of this study presents the synthesis of the composition of actors and institutions and their activities in the delivery of CBM water services. It focuses on the relationship, linkages, and partnership of the actors and how communities leverage their role to support PCS outcomes in CBM rural water delivery. Water end-user's perception of the effectiveness of and context-appropriateness is also presented in this chapter. The chapter achieved these by addressing the first two research questions relating to the extent to which institutional arrangements and linkages supported technical PCS support in Rural Water Management (RWS) and secondly the added effect and context-appropriateness of the Technical Training Support (TTS) services provided to improve CBM for WASH projects. The second research question relates to the effect of stakeholders' participation in CBM and how that contributes to sustainability in the model. This includes accessibility to spare parts, accessibility to area mechanics, distance to accessing spare parts, frequency in calling WATSAN committee meetings, and gender inclusivity in WATSAN committee activities. These are the elements in the good water government framework that are considered to answer research questions one and two.

5.2 Age Distribution of Household Heads

The study in line with the research methodology was broadly divided into two components; that is the individual household survey and the focus group discussion. A total of 407 individual respondents answered the semi-structured questionnaires during the field survey, in the Nadowli- Kaleo District. Out of the 407 respondents, 146 (36%) of them were within the age group of 36- 55, while 132 (32%) of the respondents were above the age of 56. Respondents between the ages of 18 – 35 were the least (Figure 5.1). The age variation was not significantly different (P = 0.42). Views expressed were not age-biased. Communities with the youngest age group included: Yiziri, Naro-Kavuri, and Begu, while the Goli-Dawaayiri community had thegreatest number of oldest populations (N = 14) beyond 56 years. Data gathered from thecommunities indicated that individuals within households from 18 years and above are mandated to pay for the post-construction support of the water supply and other maintenance works. Although persons under the age of 18 years are allowed to fetch water for their parents and their use, they are not part of any monetary contributions as far as the post-construction management system is concerned. It is assumed that these people (under 18), are still in the care of their parents.

Figure 5. 1.: A Pie Chart Showing the Age Distribution of Household Respondents



Source : Field Survey, May 2022

According to the GSS population and Housing Census in 2020, the NKD recorded a total of 77,057, estimating a growth rate of 2.1% per annum. The total population of the most productive cohort of the population between 15 (10-19) = 17,614, (20-29) = 13,637, (30-39) = 8,673, (40-49) = 5,770, and (50-59) = 4,331. The urban-rural population ratio is 14,751 to 62,306 making the NKD a rural district. The data, therefore, suggest that 50,025 constitute the productive population, representing 65 percent. This is reflected in Figure 5.1 where the household head/spouse was within the productive cohort of the district constituting 68% in the study area. The population cohort of 18-56 is productive to be able to contribute towards the operation and maintenance of

water systems. The sex dimension is not known but the data shows that there exists a workforce that can sustain post-construction support to CBM water supply system.

5.3 Accessibility to Technical Support Outside Borehole Community

5.3.1 Access to Area Mechanics

Area Mechanics are trained and certified people to undertake preventive maintenance of the point water system. They ensured routine and periodic maintenance of boreholes to prolong the life span of water facilities. Secondly, they also make quotations on facility maintenance costs to the WATSAN committee members for purposes of planning and mobilisation of funds to resolve challenges in the water system. Thirdly, area mechanics assemble hand pump parts and install hand pumps on newly constructed boreholes for use by community members. Area mechanics have links to spare parts distribution outlets to enable them to have easy access to pump parts that may be required for any repair works. Finally, the area mechanics educate and advise communities on how to raise funds for facility maintenance as well as the proper use of hand pumps.

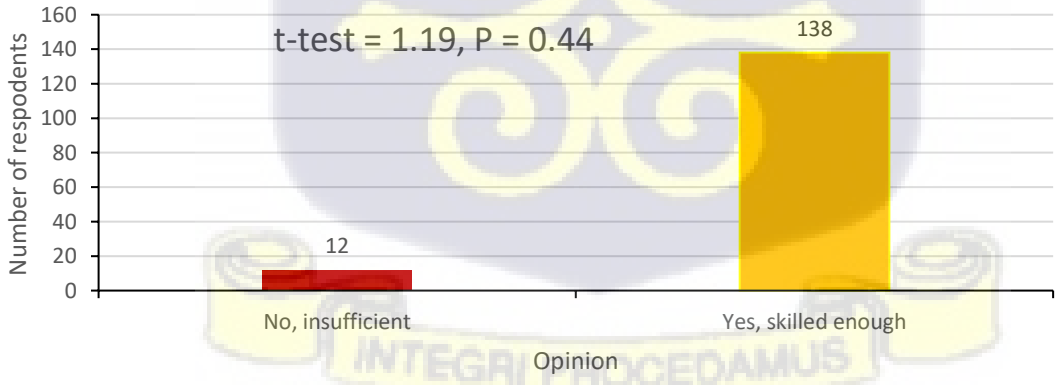
On matters relating to the accessibility of WATSAN committee members to area mechanics, the responsible for the repairs of broken-down borehole and other existing alternative arrangements, in the absence of an area mechanic, revealed that the majority of community members within the Nadowli District (n = 120 respondents, 80%) have access to area mechanics. It is clear from the explanations that even good quality hand pumps are subject to normal wear and tear, so spare parts should be reasonably available to community WATSAN committee members to purchase when boreholes break down. It was revealed in the interviews with the CWSA (See Chapter 6) that in order to facilitate the proximate availability of affordable spare parts, attempts were made

to establish spare parts sale points at the level of each district. This attempt, however, failed with its consequent challenges.

5.3.2 Capacity and Skillfulness of Area Mechanics

Despite the fact that the majority of the WATSAN committee members (n = 138, 92%) were of the view that the area mechanic had acquired the skills needed for the maintenance of boreholes, the skills required were by far insufficient to handle complex mechanical-related issues (t-test = 1.19, P = 0.44). This observation was confirmed by other respondents who expressed a contrary view of the acquisition of skills set by the area mechanic (n = 12. 8%) (Fig. 5.2). There was evidence of the fact that the area mechanic fixed faulty pumps and other accessories of boreholes or constantly checking on potential faults. These mechanics are either trained by experts or learned the art of repairs through trial-and-error means or simply by observation. The absence of area mechanics in some project communities was attributed to death or travel outside to other communities in pursuit of other lucrative jobs.

Figure 5. 2: Graph Showing Views of Respondents on Skillfulness of Area Mechanics.



Source: Field Survey, May 2022

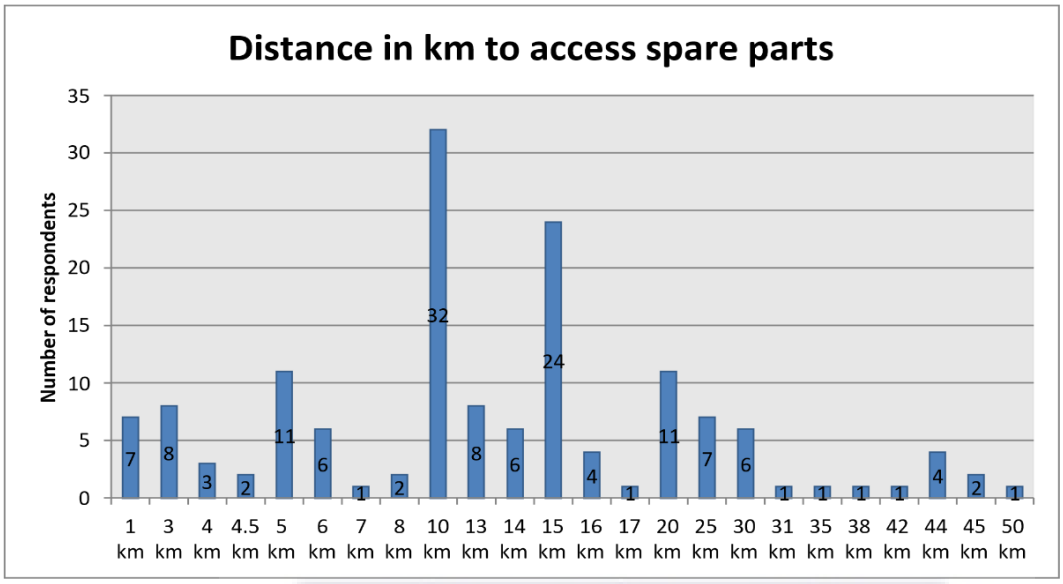
During field interviews and focus group discussions, WATSAN committee members indicated that they are sometimes compelled to rely on external support for very complex faulty pumps. Respondents thus indicated there has been plans to support the training of successive area mechanics, by expanding their capacity to handle complex faulty systems, to avoid over-reliance on support outside the reach of communities.

Most area mechanics are volunteers, and regard small water supply systems projects as community beneficiary projects, and hence do not expect any form of payment or remuneration. Another reason why area mechanics are not motivated to acquire more skills in borehole repairs is the tendency for such compensation to attract enmity and chaos since everyone would like to benefit from a community good such as water, whether the person is qualified or not.

5.3.3 Distance to Access Area Mechanics

Easy accessibility to procure the borehole spare parts, repair broken components, or request support from WATSAN committee members is a distance between 1 km and 50 km (Figure 5.3). While nearby communities trekked for an average distance of 1 – 8 km to a spare part sales point or area mechanic, to have their broken boreholes repaired, the majority of WATSAN committee members walked farther than that to access services. Some WATSAN committee members traveled distances well over 10 km -30 km on average, to repair faulty pumps or complete the installation of a broken borehole. A few mechanics or WATSAN committee members travel many farther distances beyond 31 km to 35 km. Thus, accessibility to borehole spare parts or the services of area mechanics, potentially derail the success of any intervention to make water supply available to all users.

Figure 5. 3 Views of Respondents on Distance to Access Spare Parts

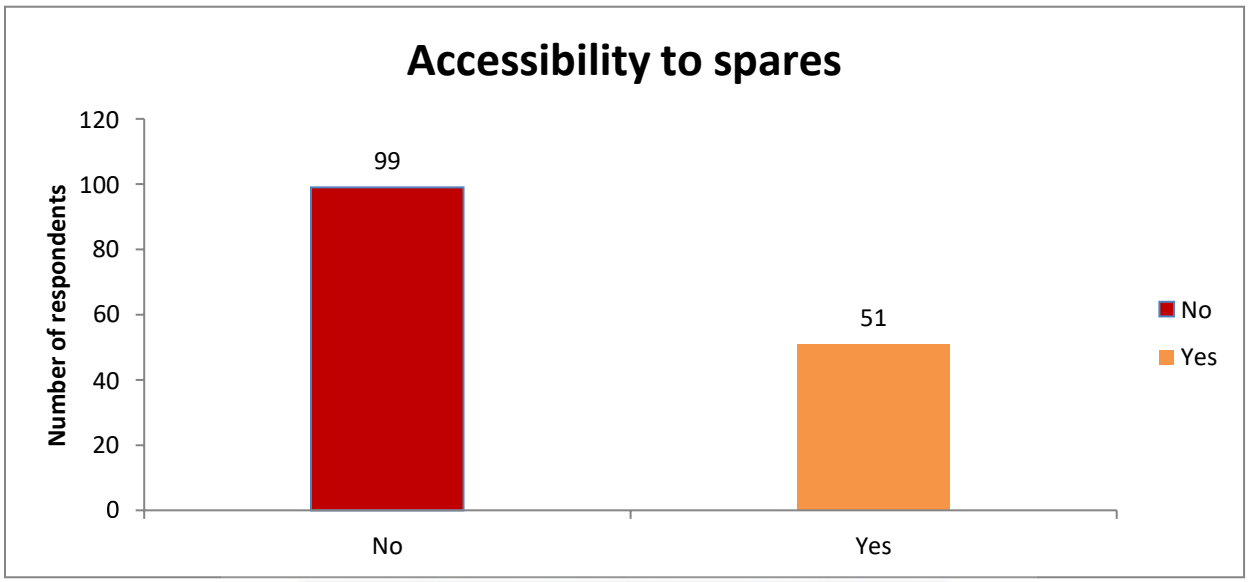


Source: Field Survey, May 2022

5.3.4 Distance to Access Spare Parts

Several accounted for the inaccessibility of WATSAN committee members to spare parts. These apparently affect the sustainability of hand pumps in the SWRSP project. And even where they are available, their unit cost is well beyond the reach of affordability by WATSAN committee members. For instance, of 150 respondents, about 66% (n = 99) indicated that the hand pump spares are inaccessible, while the remaining 34% (n = 51) responded in the affirmative (Figure 5.4). In communities where spare parts are not available, community members could access them at key merchandisers or equipment stores in or outside the region.

Figure 5. 4 Views of Respondents on Distance to Access Area Mechanics



Source: *Field Survey, May 2022*

During focused group discussions, WATSAN committee members were of the view that in some instances when spare parts are unavailable in the district, area mechanics are paid to access them outside the district or region. On instances where skilful area mechanics not available to support communities with broken down boreholes.

Qualitative data gathered through interviews with an engineer with the CWSA revealed that spare parts were available, except that WATSAN committee members at the community level find it difficult to pay for them because of high cost. He stated that:

"We (CWSA) did what we called spare parts linkages within the communities, showing the communities where they will get available spare parts to fix their boreholes. We don't fix spare parts prices…we sought to facilitate the establishment of spare parts dealers in all the districts so that there will be proximity and availability of spare parts, but this did not work because it was

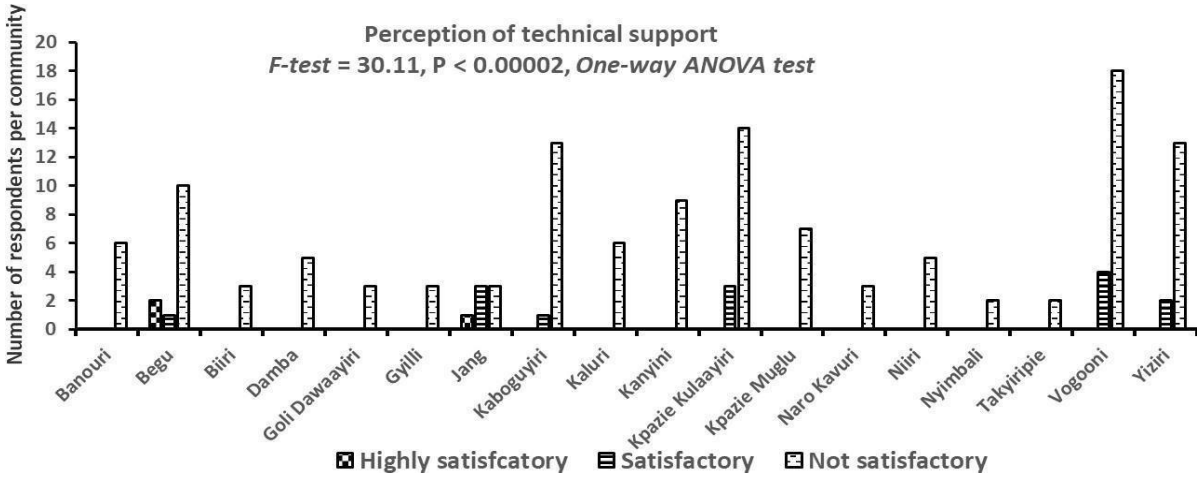
difficult to get business people within the districts which were willing to invest in spare parts sales…".

(Participant Interview with CWSA Staff, Wa, May 2022)

5.4 Water Users and Technical Ability to Sustain Sustainable Rural Water and Sanitation Programme

Across 18 SRWSP beneficiary communities, a One-way ANOVA test results showed that the technical ability to sustain the SRWSP water system by water users (WATSAN committee members), was significantly different (F-test = 30.11, P < 0.0002) (Figure 5.5). This was so because the capacity of water end-users under the CBM system was largely dependent on the availability of financial resources to procure and replace broken parts of the water supply systems and the technical competence of area mechanics to readily provide the needed support services, as shown in (Figure 5.5). Despite the respondents' varied opinions about the technical support extended to them under SWRSP water supply service, the findings revealed that they were generally unsatisfied with the technical support across the 18 communities. The general unsatisfactory nature of follow-up support was manifested in their responses to the respective aspects of technical and financial support expected. Except for two WATSAN committee members in two communities who responded in the affirmative on grant support for small boreholes, all other respondents disagreed or were not satisfied with the form of technical or financial support extended to them under the SRWSP service i.e. grant for ordinary repairs, majorrepairs, and daily management. The chi-squared test statistics ($\chi 2$ = 8.09, P = 0.09) revealed the general unsatisfactory technical or financial support as expressed by nearly 95% respondentsof WATSAN committee members (n = 40 member responses).

Figure 5. 5: Graph Showing Level of Follow-Up Support Since SRWSP Implementation



Source: *Field Survey, April 2022*

Field data obtained through interview with borehole attendant in the study area revealed the following from a 42 year-old woman in Kaluri who states as follows:

"One person who has always been very helpful to us is our MP because anytime the borehole breaks down, and we complain to him, he will repair it for us. If we had external support, I don't think we would have been suffering like this way. We have never heard that any of them has provided any special support. The philanthropists stopped contributing because the government or political boreholes are free, so they don't see why they should be paying for that one or contributing to its maintenance".

(Interview of Borehole Attendant, February 2022)

The comments of the woman are evidence of the failure of institutions to support the post construction follow-up support needed to sustain the SRWSP water supply system. The contribution of individuals towards SRWSP is rather more significant than institutions that are

expected to offer support after water facility construction. In some instances, non-state institution come in to support more than that of the state. It also revealed the effect of providing 'free' boreholes to communities by philanthropic individuals, NGOs and institutions. Water end-users feel reluctant to contribute to the O & M activities because of the availability of all alternative source of water. This leads to the collapse of the earlier water supply system. It is important to note that the role of key actors in community volunteerism is a drawback to community participation in water supply facility operation and maintenance. The expected external support capable of ameliorating the burden of rural communities was taken over by political actors such as Members of Parliament and other philanthropists. This is a major challenge to sustaining community operation and maintenance. Members of water user committees are of the view that the provision of boreholes, operation, and maintenance was the sole responsibility of District Assemblies. WATSAN committee members are not satisfied with the level of technical support extended to them by outside actors and institutions. The implications for the sustainability of the CBM model are negative. Apart from Vogooni. Yiziri, Kpazie Kulaayiri, Kaabogu, Jang and Begu, all other communities did not see the significance of the kind of support extended to them to support borehole maintenance and sustainability.

5.4.1 Actors and Institutional Bottlenecks Implementation

According to the stakeholder engagement with the ProNet North (NGO), the collaboration between the public sector and non-state actors has been favourable in the short-term. It has not been so difficult for actors in the rural water sector to network to defined roles and understand themselves. They all believe that water provision is the state responsibility and for that matter government agencies such as the CWSA, District Assemblies hold the responsibility to make it

available and not the private sector. Non-Government Organisations and CSOs also support rural water delivery. Ghana's local government system is structured to create the enabling environment for "common goods" services, including water delivery to communities. District Assemblies coordinate the activities of stakeholders to support CBM services. There are however coordination failures on the part of district assemblies making CBM weak in terms of the required institutional support, political planning, weak tariff structure, limited financial resources, poor maintenance culture to borehole functionality, access to spare parts, and technical support from outside (Smits et al., 2013). In the understanding of Schweitzer et al. (2014), the frequency of visits to water supply systems by external agencies to provide technical backup minimizes borehole breakdown. Local government institutions lack the capacity and resources to support rural water systems. A senior officer with the Nadowli-Kaleo District Assembly summarises it as:

In most cases, because they are not functioning, so the Assembly comes in to help them repair. Sometimes it could be financial or technical, depending on the intensity of the problem. If the issue is huge, we need to – you know assembly we don't have the people with the expertise, so we have to resort to someone to do it on our behalf. (KII with NK District Assembly Officer, May, 2022).

Communities that benefit from water and sanitation projects create linkages among actors to enable access to needed interventions for CBM. It is clear from the discussion that CBM systems and sustainability in operations are highly dependent on the level of coordination and capacity of actors at the community level. Stakeholder coordination will facilitate the cordial relationship between actors and institutions and the water user population (Whaley et al., 2017, p.12) including WATSAN committees.

Operational components CBOs (WATSAN committee members) such as financing, cost recovery, and O&M will be addressed.

5.4.2 Follow-up Training and Local Capacity Building

Training and skills development were given to WATSAN committees that benefitted from SRWSP water project before boreholes were constructed. Solomon-Ayeh and Asare Osei's (2012)study conducted in the Ashanti Region of Ghana in three settlements - Aboaso, Abenkyem,and Juansa suggest that end-users' skills and knowledge contribute positively to meet good standards sustainability of water supply systems. In the Aboaso, Abenkyem, and Juansa cases, end-users of community water supply systems repair boreholes and also upgraded handpumps to mechanized standing water system and thus minimize frequent breakdown. As pointed out by Mvulirwenande et al. (2017), an interrelated level of capacity development in the water sector requires individual, organisation/institution coordination, enablement of the appropriate environment, and civil society support. Their findings resonate with the position of Sayato (1989)who acknowledges the slow, complex processes in capacity development in the water sector. It emphasizes the need for long-term investment from donors to improve institutional capacity.

5.5 Conclusion

The chapter presents findings on the age distribution of household heads in the study area and its implications for water supply systems under the SRWSP model. The respondents were not above the age of 56 years and not below the age, 1 year. These ages are within the productive ages by standard and are assumed to be capable of making contributions towards operation and maintenance services of water supply systems. It also presents findings on community access to area mechanics in times when boreholes breakdown and need repairs. Area mechanics are trained to diagnose faulty boreholes and repair them if possible. The availability of area mechanics and ability to pay for their services is a matter of concern to communities. Although area mechanics sometimes report faulty boreholes to DAs for support when the damage is beyond their ability to

repair, on most occasions, minor damages are repaired by themselves. Respondents requested that area mechanics be given refresher training to upgrade their skills, although they agreed that they are very skillful enough to repair broken down boreholes. The distance to access to borehole spare parts is a challenge to WATSAN committee members in a rural community with no easily affordable means of transport services. It is clear community water handlers know where to access spare parts and the spare parts are available. The challenge is the cost of buying them. Community water committees find it difficult to raise cash from within to make these purchases. The findings are clear that water users and water committees do not receive support from state and non-state agencies since the end of the project. Local representatives of the people the DAs don't do much to attract local government authorities to come to their aid in pump repairs. The findings conclude that the cost of O & M in rural water supply is high.

CHAPTER SIX

ROLES, CONTRIBUTION AND EFFECTIVENESS OF WATSAN COMMITTEE

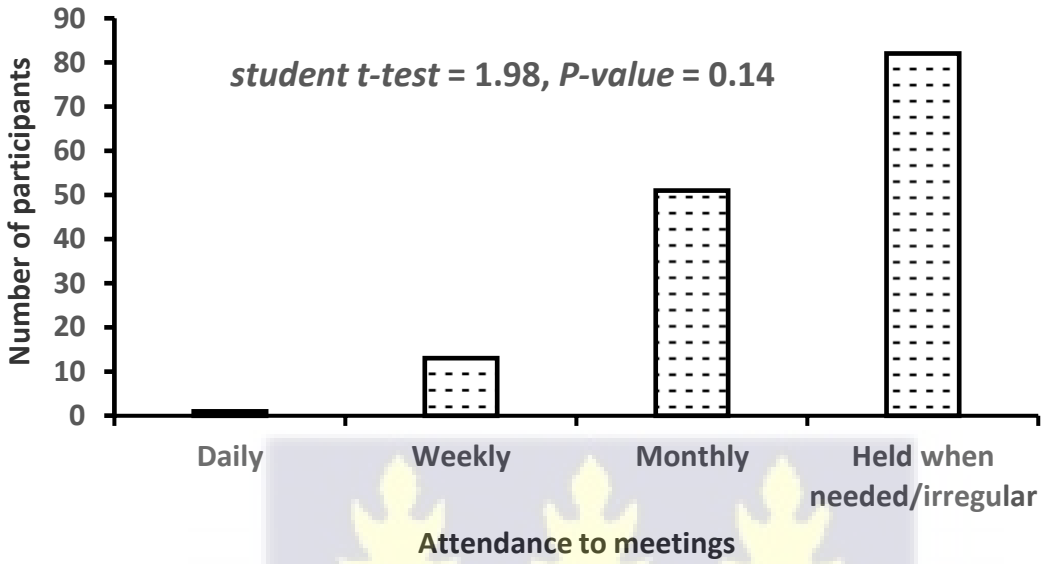
6.0 Introduction

This chapter presents the effectiveness of WATSAN committee members towards the sustainability of the CBM implementation. The study in chapter one (1) already indicated the role and functions of WC as the community managers of water systems at the source point level. Undoubtedly, their role is very crucial to the success of CBM water supply systems. The chapter also looked at the frequency at which members attend meetings and the gender composition of these members. It is important to understand that women participation in WC meetings is a requirement for the success of CBM water supply system. The chapter also gave its findings on how WC members were selected and whether it was a democratic accepted within the community. Views of WC members are presented in this chapter. The chapter concludes with finding of the kind of institutional collaboration between institutions such as the CWSA to the WC in local management of water systems.

6.1 WATSAN Committee Members and Participation in Meetings

Generally, participation in CBM meetings was found not to be significantly different either daily, weekly, monthly, and even when the need arises or emergency cases (Student t-test = 1.98, P = 0.14) (Figure 5.5). As part of the by-laws of the communities, the scheduled daily, weekly, and monthly CBM meetings were expected to be strictly adhered to by all WATSAN committee members. However, this was not the case, as participation only occurred when a community's water supply experienced a breakdown or faulty. For instance, the frequency of participation in irregular meetings stood at 82 attendants, while daily attendants were the least (n = 1) (Figure 5.5).

figure 6. 1: Frequency of WATSAN Committee Member Attendance to Meetings



Source: *Field Survey, May 2022*

Despite the fact that WATSAN Committee member participation in CBM activities in the 18 communities was largely a masculine dominated (giving its laborious activity characteristics), student t-test results showed that female participation in WATSAN Committee meetings relative to their male counterparts were not substantially different (student t-test = 3.32, P = 0.07). Even though female participation in CBM activities was not substantially different from males, female members participated more than three times fold in CBM activities (n = 71) than their male counterparts (n = 21). This reflected in their stronger commitment to CBM activities, in view of the fact that female members in the communities are by far the major water users for daily domestic chores (Figure 6.6). The standard ratio of female-male participation in CBM activities is for

females not to be less than 30 percent of total representation. Consensus building during field discussion showed that the inclusion of women in operations and maintenance should not be less than 40%.

Even when they are part of a meeting, they are not given free will to make decisions; a reason linked to a typical northern traditional societal setting, where it is believed that the woman is to be seen and not to be heard.

6.2 Actors and Institutions Role in Post-Construction Support services

The CBM model as a public sector reform operated in the Nadowli-Kaleo District since 2015. The conception of the model expected outputs in the post-construction phase which includes beneficiary communities to be sensitised on existing water and sanitation profiles, formations, and election of community leaders and WATSAN committees, and heads of District Assembly (DA) inaugurates formed WATSAN committees. The main objectives of the SRWSP inthe Nadowli- Kaleo District were to establish the management and organisational capacity of communities to effectively manage water and sanitation facilities, create and empower communities through awareness creation and promotion of hygiene and sanitation, promote community ownership and management and build communities' commitment towards the sustainability of the water and sanitation facilities.

The main activity that focused on follow-up support is monitoring and strengthening the performance of WATSAN committees for hygiene and sanitation promotion, training committee members in O&M, and establishing linkages and support systems for stakeholders and other actors in the water sector. This study's results show water users and committee members are unsatisfied with the external support received from stakeholders and institutions. It stresses that:

"…. people who came to check on the borehole, they came last year, but I have not seen them this year."

(interview with a Member of a FGD, Vogooni, May 2022).

This is evidence of how structured external supports are extended to communities and how the Community Water and Sanitation Agency (CWSA) and District Assemblies are incapacitated in the follow-up CBM system. The question is whether institutions can enhance CBM systems. This is how one caretaker put it:

"….and if we had external support, I don't think we would have been suffering like that. We have never heard of them providing any special support."

(Interview with a Borehole Attendant, Yiziri. May 2022).

However, institutions are expected to be the nexus and context for actors and stakeholders to interact. Institutional support to communities can lead to the WATSAN Committee's increased desire to deliver services appropriately, frequent rehabilitation of broken-down boreholes, willingness to pay user fees, and increase membership of the WATSAN Committee (Etongo et al., 2018). The study identified the Member of Parliament (MP) who supports community water supply, especially when it is time for parliamentary elections. Parliamentary elections come off after every four years. This means that the community members might have to wait for a longer time to obtain external support since support from MPs is not intended for strengthening institutions but for personal benefit. It is also possible that support from local politicians and the politicisation of extended support could not effectively be a remedy to the general water needs of communities and the existing managerial defects inherent in CBM.

In the conclusions of (P. A. Harvey & Reed, 2003; Zvobgo et al., 2022), the enabling institutional and organisational environments are prerequisites for water committees to operate and develop capacities. The period of engagement between the District Water and Sanitation Officer from the Nadowli-Kaleo District was low apart from the pre-construction phase of the water project. These defeats the principle of the demand-driven CBM model where the central government is off-loaded with the responsibility of project development, ownership of borehole facility and O&M as seen in (Moriarty et al., 2013).

In contrast, water committees that take full responsibility to be more responsible to sustain ownership tend to charge higher fees to meet the cost of operation and maintenance (water governance and sustainability). This means that community end users will default in payment or revert to other sources of water for consumption. Institutional empowerment is well elaborated upon by Project Implementation Management and is significant to sustaining CBM. External actors (donors/NGOs) have been found to register higher performance than local and central government institutions. This affirms the findings of this study, which show the low presence of state actors/institutions in support of CBM sustainability.

6.3 Challenges of Actors and Institutions to Support Sustainable Rural Water and Sanitation Programme

According to the stakeholder engagement with the ProNet North (NGO), the collaboration between the public sector and non-state actors has been good, but it has not been so difficult for actors in the sector to be able to work together because the actors' roles are clearly defined, and they understand themselves. Therefore, they all believe that water provision is a government responsibility and for that matter the government agencies such as the CWSA. District Assemblies holds that responsibility now and the private sector. Non-Government Organisations and CSOs

also support rural water delivery. Roles are clearly defined when there are no problems to collaborate, and the way projects are structured to support sustainability. Ghana's local government system is structured to create the enabling environment for "common goods" services, including water delivery to communities. District Assemblies coordinates the activities of stakeholders to support CBM services. There are coordination failures on the part of district assemblies making CBM weak in terms of the required institutional support, political planning, weak tariff structure, limited financial resources, poor maintenance culture to borehole functionality, access to spare parts and technical support from outside (Smits et al., 2013). This affirms the quantitative findings of the study, as shown in the matrices generated by the Principal Component Analysis for predictive factors militating against CBM in the Nadowli-Kaleo District. In the PCA analysis as indicated in (Figure 7:1), Dambaa, Takyiripei, and Banuori identified monetary contributions, contributions towards minor repairs, and O&M towards repairs as major constraints to their water systems. To the understanding of Schweitzer et al. (2014), the frequency of visits to waters systems by external agencies to provide technical backup minimises borehole breakdown. Local government institutions lack the capacity and resources to support rural water systems. A senior officer of the Nadowli-Kaleo District Assembly summarises it as:

"In most cases, because they are not functioning, so Assembly comes in to help them repair. Sometimes it could be financial or technical, depending on the intensity of the problem. If the problem is huge, we need to – you know, assembly we don't have the people with the expertise, so we have to resort to someone to do it on our behalf."

(KII Interview with NK District Assembly Staff, May, 2022)

Communities that benefit from water and sanitation projects create linkages among actors to enable access to needed interventions for CBM. A key informant emphasises the significant role of borehole caretakers when she said:

"They don't even need to see the whole community or even get to us. They know where to get their spare part."

(KII Interview, Kpazie Muglu May 2022).

As further stressed by this respondent, most of the names of the spare parts are not an issue since the communities have a local way of describing them to the understanding of spare parts sellers. In that case, they can create that linkage, and other institutions coordinate activities among themselves as actors. A senior technical officer at the UW regional office of the CWSA articulated the need for a holistic approach to capacity training as:

"We need to capture all refresher training in the medium-term development plans ofthe MMDAs with required budgetary allocations. So, one of the suggestions we will put on boardis that training should be factored into the MMDAs' MTDPs and its associated budgetaryallocations to be made available. This has huge implications for funding. So, we need to plan welland provide budgetary allocations for the MMDAs and CWSA to have the refresher training done."

(KII Interview with CWSA Staff, May, 2022)

It is clear from the discussion that CBM systems and sustainability in operations are highly dependent on the level of coordination and capacity of actors at the community level. Stakeholder coordination will facilitate the cordial relationship between actors and institutions and the water user population (Whaley & Cleaver, 2017) including WATSAN committees. Operational

components of CBOs (WATSAN Committees) such as financing, cost recovery, and O&M will be addressed.

6.4 Community Participation in Decision-making

From the engagement with a key informant during a one-to-one discussion, it was obvious that there was a need for broader community participation, especially with women who are the major users of the water. The engagement with ProNet North, in particular, revealed that it is true that the communities are poor, but water is a need for both the poor and rich to participate in the community water service and decision-making processes. Communities require water at all costs. "The first strategy I think will help the project most is, I think, the issue of ownership" (ProNet North). Communities are allowed to pay an initial contribution as a means of inculcatinga sense of ownership of water facilities and responsibility for good care of the facility. In the mindof Day (2009), WATSAN practitioners are warned not to undermine the quality of decision- making by local people who own water systems. Ownership of water systems, particularly women's involvement as the main users of the water, is relevant and key for the sustainability of the community borehole systems in the study area. A key respondent opined that a sense of ownership was a good strategy for the sustainability of the CBM model where they pay part of theconstruction cost and also setting up the WATSAN committees within the community is the mainresponsibility of local managers. These committees, according to respondents, were self-selected as a form of participation, with the majority of them being women. The communities themselves,as seen from the field report, facilitated the selection process of their committee membership. It also gave them that sense of ownership that they are managing their resources. The sustainability financial, technical, social, environmental, and institutional sustainability of CBM-supported water delivery is based on community collective action. In seeking to understand the factors that influence the sustainability of community-managed water facilities in three districts in Zimbabwe

(Kativhu et al., 2022), community participation at both the planning and post-project implementation phases are mentioned as critical for rural water sustainability. This perspective as shown in the Zimbabwe case suggests that active community participation that minimises the inadequacies of O&M challenges and lack of willingness to contribute towards repairs.

As evident from the study of (Kelly et al., 2017), social capital denotes water system solicitation, resource mobilisation, water committee formation, and information collection and sharing. A crucial aspect of the study is its referral to community ownership and social capital as facilitators of community participation, gender equality, resource mobilisation, and female participation. Women do better when they are in groups. They can mobilise themselves easily to support communitive-initiated projects. This explains why the Community Water and Sanitation Agency Act, 19981 (CWA, Act 19981) in the clause (1) (ii) "enables the District Assemblies to encourage the active involvement of the communities, especially women in the design, planning, construction, and community management of projects related to safe water supply and related sanitation services". In a demand driven CBM community participation resonates with water users being given the opportunity for their opinions to be listened to in the project planning process, water users' free will to participate in O&M, leaders advancing plans to improve water facilities and planned O&M without any external follow-up support.

6.5 Selection of WATSAN Committee Members and Water Managers

It emerged from the field interview that committee members from the 28 rural communities were not selected through election or volunteerism, but rather through an unstructured criterion of appointment. The selection of WATSAN members and caretakers following initial post-construction select processes was facilitated by CWSA and the District Assembly and in collaboration with the traditional authorities and the community. However, for the post-construction period, the selection of members of the WATSAN Committee is based on sectional

representatives or imposition of members by the chiefs and elders of the community. In different borehole beneficiary communities, WATSAN committee members explained how they became members:

"Some people were selected at a community meeting to take good care of the borehole and repair minor problems with the borehole."

(Community A)

"The chief selected us, after which we went for the training."

(Community B)

"The community is in sections, therefore two people (male and female) were selected at a community meeting from each section to serve as WATSAN committee members."

(Community C)

"…it is only women who are at this meeting, and you know women cannot make decisions, if the men were here that would have been good…".

(Community D)

The criteria for the selection of WATSAN committee members as said in (Community A) are by selection with the responsibility to handle minor repairs of broken-down boreholes. The task was limited to just repairs. The participation of community leaders (chiefs) (Community B) participated in the choice of WATSAN committee members. These opinion leaders vetoed the choice of members. But in the end, women attended meeting sessions (Community C) than men. They didn't

take decisions on the borehole O & M because of the absence of men. As indicated in (Community D) the role of men and women played a significant role in O & M activities.

6.6 Conclusion

In Chapter Six of this study, the set of objectives was to a). examine the extent to whichinstitutional arrangements and linkages support PCS in Rural Water Management (RWS) and investigate the added effect and context-appropriateness of the Technical Training Support (TTS) services provided to improve CBM for WASH projects and b). examine the level of participationof actors and institutions in delivering the CBM demand-driven CBM model. Communitymanagers of boreholes are expected, as part of their PCS responsibilities, to relate with actors outside the community to provide repairs on broken-down boreholes. Access to area mechanics, level of the skills of area mechanics, cash availability, and availability of spare parts determined how communities can respond to water supply challenges when boreholes break down. It is therefore clear that the affordability of spare parts is the biggest challenge to the repair of boreholes. Participation of women in O&M is also realised to be very important in determining the sustainability of boreholes' water supply. The evidence shows that women are not much engaged in PCS activities, although 40% of them are part of WATSAN committees. The evidencealso reveals that community managers are not satisfied with the kind of technical support extendedto sustain boreholes' water delivery. Perceptions amongst communities in the study suggested thatthe absence of external support was average, not satisfactory, and was responsible for thechallenges of sustaining boreholes' water delivery. The findings of the study show that end-users of water prefer the installation of new boreholes as a mechanism to reduce cost, further training for WATSAN committee members and area mechanics at the community level, and lesser burden

towards contributions towards O & M activities. Technical support to end-users was scanty and did not contribute much to support post-construction support in the NK District.

CHAPTER SEVEN
CHALLENGES OF SUSTAINABLE RURAL WATER SUPPLY PROJECT IMPLEMENTATION

7.1 Introduction

As indicated earlier in the introductory Chapter One of this study, the presentation, and analysis in this chapter intend to achieve two objectives. These include assessing the militating factors that serve as challenges to the effective implementation of the demand-driven SRWSP-CBM model in the Nadowli-Kaleo District. The PCS implementation challenges in these communities determine the sustainability of CBM water supply system. Evidence of findings is presented with the use of pie charts, histograms, and tables. The implementation of SRWSP under IDA-World Bank funding support was within the overall national policy of Ghana NCWSP in 2015. It intended to support rural communities to plan, construct, and operate their own water and sanitation facilities. Its main objective was to establish management and enhance organisational capacities of communities, create awareness, promote, and empower communities to handle management challenges of point source communities, promote the concept of community ownership and management, and build communities to commit to the sustainability of water and sanitation facilities.

In chapter seven, the study examines the interface between the installed boreholes and how end-users operated and maintained these facilities to sustain benefits over a period of time. The independent variables that were considered in this analysis are community-level pre-construction and implementation factors, household-level income characteristics, percentage of households that trust water committee managers, community-level population characteristics, skills and capacity, and community belief system.

7.2 Major Challenges Against Implementation

To determine and test the key factors militating against these post-constructional support services, a few statistical analyses were employed. These include principal component analysis (PCA) and other descriptive analyses. The results from PCA (Figure 7.1) segregated the communities in each of the four sections of the ordination diagram according to their response level to militating-related factors. The first communities on the upper left (Dambaa, Takyiripei, and Banuori) and Kaboguyiri, Jang, Vogooni, and Goli Dawaayiri (clustered on the upper right of the diagram),were dominated by Dagaaba indigenes with some isolated minor tribessuch asMoshe and Gonja natives. These communities found monetary contributions towards major operations/maintenance and minor maintenance/repairs of their boreholes as the keychallenging issues. This was confirmed from the field focus group discussion and interviews, thateven though women are the main users of water and have an in-depth knowledge of the water supply management issues, maintenance of the boreholes is done by a few selected male WATSAN committee members. A 52-year-old caretaker in Kaabogu of a borehole in one ofthe study communities stated this:

"…we have men here who usually repair it, but if they are not able to repair it, then we rely on somebody from Nadowli township. From the look of things, no matter how we repair this borehole, it will continue to break down; so, I suggest we get a new borehole. I think we have probably not been able to diagnose the problem of this borehole… I recommend we change all the parts. We have serious water problems in this community…we would have been better off if the borehole was working well."

Participant interview, Kaabogu, May 2022

This confirms the quantitative findings in Kaboguyiri, Jang, Kaluri, Goli Dawaayiri, Vogooni, and Kanyini in the PCA analysis in Figure 5.2 which shows the challenge of maintenance of

boreholes as a major obstacle in implementing the demand-driven CBM water supply in the study area. The few selected WATSAN committee members had limited capacity to handle the operations and maintenance, and to carry out minor maintenance works on the boreholes in the various communities. WATSAN committee members and water end-users get frustrated with the use of boreholes in their communities.

Other findings gathered from field interviews among WATSAN Committee revealed that the permanent borehole committee activities set up in one of the study communities were obstructed by the assembly member of the community, which negatively affected the entire management system of the borehole. According to the borehole WATSAN committee chairman, the assembly member seized the borehole managerial systems from the selected committee members, including the monies that were meant for the regular maintenance of the boreholes in the community. For example, from a transcribed interview, a WATSAN committee member from the Kaluri community indicated that the assemblyman had a different contractual agreement witha different person, and hence confiscated the borehole management system and gave it to that person. The study results revealed that:

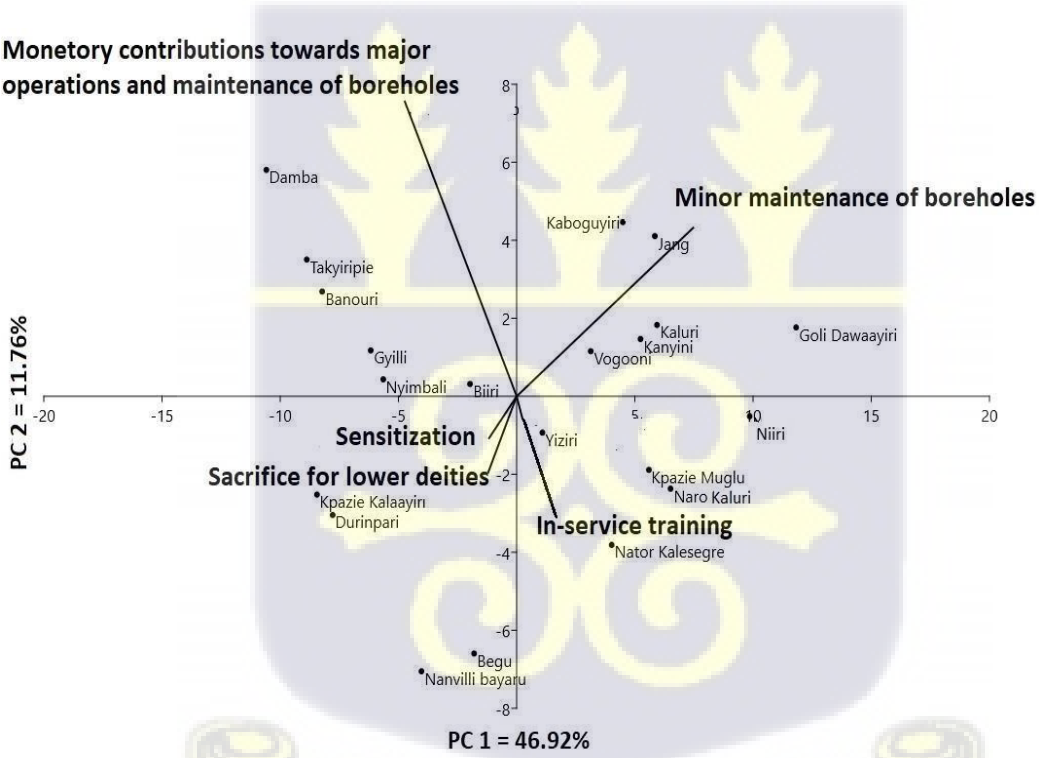
"The assemblyman is not a WATSAN committee member, but he brought a different mechanic from somewhere to collect the monies meant for the maintenance of theborehole, Kaluri WATSAN committee representative."

Participant interview, Kaluri, May 2022

This setback event infuriated the WATSANC members, thus leading to the abandonment of the entire boreholes' maintenance activities in the community. A similar issue of financial irregularities or misappropriation was observed in the Nato-Baanuori community, leading to a halt

in the maintenance of borehole systems. Furthermore, respondents from the second communities in the lower right, namely Yiziri, Niiri, and Kpazie Muglu, indicated adequate in-service training as their major issue compared to monetary contributions towards major operations and maintenance. Insufficient sensitisation and sacrifice for lower deities were the concerns of members from Durinpari and Kpazie Kalaayin communities (lower left of the ordination). The first two axes (PC2 = 46.92% and PC1= 11.76%) of the PCA ordination analysis accounted for 58.68% of respondents varied views about factors militating against the realisation of PCS services, as indicated in Figure 5.2 below.

Figure 7. 1: Pearson Correlation Analysis Showing Ordination Analysis



Source: *Field Survey, May 2022*

The 50% variance in respondents' views was an indication that they have an idea of the factors that are affecting these post-constructional support services, but there might be some confounding factors beyond their control. The matrices generated by the PCA, showed that monetary

contribution towards major operations and maintenance of boreholes (r = -0.53*, P< 0.05) and minor maintenance (r = 0.83, P < 0.001) strongly correlated with axes I and II (r = 0.84, P < 0.001) and (r = 0.48, P < 0.05) respectively, and explained most variance in PCS-community concerns relationship. Although the militating-related factors for axis I & axis II that were significant (Df = 4, F-test = 30.63, P< 0.0001), the eigenvectors were not significant for axis I & axis II (P< 0.63, Monte-CarloP test). Correlations between predictive militating factors showed that monetary contribution towards major operations/maintenance and minor maintenance of boreholes (rs = -0.57, P< 0.006), sensitisation and minor maintenance of boreholes (rs = -0.59, P<0.005), minor maintenance of boreholes and sacrifice for lower deities (rs = -0.7475, P< 0.0009), contributed significantly to influencing post-construction services setbacks (Figure 7.1). These relationships have largely been reflected in the results of the field survey. However, sacrifice to the lower deity did not get much support as a factor in Figure 5.2. They accepted the role of ancestral worship but agreed that the best way for community boreholes to continue to flow was through the contribution of all water users. In a FGD in Nyimbali, an elderly woman of 63 years old who is still active in water management affairs commented as follows:

"…Prayer is the most important; if you don't pray, you will not even get the money to contribute. There are times they will drill deep and not hit water, so the elders will have to do some sacrifices in order to get the water. It was also only when they came for the drilling that our elders made some sacrifices, but since then, there have not been any sacrifices again. If not, we don't have that here; all we do usually is contributing cash to keep our borehole running…"

Participant interview, Nyimbali, May 2022

The black dots represent the different communities, while the arrows represent the factors plotted pointing in the direction of maximum change of explanatory variables of the different communities. Axes I = 49.92 % and II = 11.76% jointly explained the 58.68% influence of the factors militating against post-construction support services in the Nadowli-Kaleo District Assembly. This affirms the quantitative findings of the study, as shown in the matrices generated by the Principal Component Analysis for predictive factors militating against CBM inthe Nadowli-Kaleo District. In the PCA analysis as indicated in (Figure 7.1), Dambaa, Takyiripei,and Banuori identified monetary contributions, contributions towards minor repairs, and O&M towards repairs as major constraints to their water systems.

Table 7.1: Spearman Rank Intercorrelations of Predictive Variables

	Monetary contribution for major operations/maintenance	Minor maintenance of boreholes	Sensitization	Sacrifice for lower deities	In-service training
Monetary contribution for major operations/maintenance		0.006	0.093	0.064	0.069
Minor maintenance of boreholes	-0.570		0.005	9.83E-05	0.18626
Sensitization	0.375	-0.59059		0.00019285	0.14781
Sacrifice for lower deities	0.411	-0.7475	0.72632		0.49888
In-service training	-0.403	0.3001	-0.32709	-0.15623	

NB: Values above the black diagonal line represent the level of significant, whereas those below represent their respective correlation statistics (R^2). Significance of R values: $^*P < 0.05$; $^{**}P < 0.001$

Source: *Field Survey, May 2022*

7.2.2 Minor Maintenance of Boreholes

Having listed the key factors militating against post-construction support services under the CBM model (i.e., failures to repair broken down boreholes and having to rely on external support from

the NKD capital for support), WATSAN committee members during the focus group discussion proffered best practices that could help improve their financial strength and consequently reflect on the operations and maintenance culture of the boreholes. These include enhancing domestic revenue mobilisation and training/capacity building of local mechanics. However, other end-users of water from these boreholes prefer having new boreholes instead of the constant breakdown and the difficulty in repairing those installed many years ago.

7.3 Measuring the Cost of Operations and Maintenance

7.3.1 Willingness to Pay for Operations and Maintenance

The themes emanating from a discussion on willingness to contribute or pay for the operation and maintenance of pumps showed that communities did appreciate the importance of monetary contributions meant for the operation and maintenance of pumps. However, due to issues of mismanagement, non-accountability, and the deliberate refusal of some persons to contribute, communities are increasingly growing apathetic and fatigued in terms of making financial contributions. This setback has led to frequent breakdown of boreholes, which is demotivating to community end-users of boreholes. This always comes as a burden to women whose livelihood is attached to the use of water.

7.3.2 Contribution Towards Operations and Maintenance

Community members have expressed worry about the drain of their meagre income, as a result of constant contributions to the operations and maintenance of boreholes in an FGD with women in Vogooni, they explained as follows:

"We should be making periodic cash contributions so that anytime it breaks down we give the men what we have mobilised for them to also add up and repair the borehole. We can do it (cash contributions) the day after the market day; at least by then people would have sold something in the market and would therefore have some money. We used to sell charcoal and firewood, but now all those things have been banned. So, when it is time to make contributions, it's our groundnuts that we sell in order to be able to contribute…"

Women FGD, Vogooni, May 2022

This concern was observed during a focused discussion among respondents at the study site. Due to the hefty burden on their income, respondents indicated the need for the introduction of programs and projects aimed at providing alternative livelihood options to rural inhabitants, especially women, besides the subsistence agriculture they are currently engaged in. Others suggested the development of a payment schedule that is convenient for the contributors, such as paying a day after a "market day" and the periodic payments made over a phase-out period. This approach will probably reduce the burden of constant monetary contribution at the spur of the moment to repair broken down pumps.

7.4 Household Cost and Burdens towards Operation and Maintenance

7.4.1 Poverty and Community Capabilities to Support Operations and Maintenance

The NKDA is one of the poorest districts in Ghana. Records recommend that the participation of its people in decision-making is very low. In community consultation for the purpose of a district level development planning process, only 23% of its people are known to participate in local community-level decision-making process (Koyra, 2020). The NKDA is ranked 17th in Ghana,

representing 68.5 percent of poverty head count in 2015. That is to say that 41,629 of its people are classified as poor (GSS, Ghana Poverty Mapping Report, 2015). In the area of employment, the population who is eleven (11) years and older who are illiterate is 49.0 percent (Ghana Statistical Service (GSS, 2013). This is contrary to the United Nations set agenda in Sustainable Development Goal 4 in 2015 which target to "Ensure exclusive and equitable quality education and promote lifelong learning opportunities for all" (UN Water, 2018).

The widespread poverty level among the indigenes in the study area affects their ability to contribute to the operation and maintenance of the pumps. There are barely any other livelihood activities besides farming. The few community members with other livelihood activities like charcoal production do not even earn so much from their sales. A 49-year-old opinion leader of Gyilli explained his inability to contribute towards O & M as:

"…due to the poverty situation in the community, people find it difficult to pay. We are even struggling to get the GhȻ 5, so we cannot talk about increasing it. The GhȻ5 is fine. Sometimes, we don't even have money, but you are forced to go and sell charcoal at Nadowli market, get the money and come and contribute for the repairs. Just that it's sometimes difficult for usto mobilise the funds because we don't have any work that can help us generate money…".

Participant interview, Dambaa, May 2022

This explained why the majority of community members struggle to contribute to the operations and maintenance of boreholes and hence their limitation in participating in the CBM model across all communities in the study area. This assertion is confirmed in the PCA ordination analysis in fig.5.2 where respondents in Dambaa, Takyiripei, Banuori, Gyilli, Nyimbali and Biiri identified the major militating factor against sustaining PCS in the CBM model to be the difficulties in

monetary contributions. The matrices generated by the PCA, showed that monetary contribution towards major operations and maintenance of boreholes ($r = -0.53^*$, $P < 0.05$), which is higher as compared to ($rs = -0.7475$, $P < 0.0009$) for sacrifices to minor gods and maintenance of boreholes.

7.4.2 Burden of Monetary Contributions to Households

The burden of monetary contributions by the communities to support the community water supply systems is characterised by several factors, which include but are not limited to the non-availability of jobs for the communities to do as Income Generation Activities (IGAs). While a number of the women, in particular, stressed limited Income Generation Activities (IGAs) for them to support the monetary contribution to the post-construction support to the communities' boreholes maintenance, other factors such as funeral activities, payment of children's school fees also emerged to be key issues that negatively affected the communities' ability to generate income to pay for the borehole's maintenance in the communities. While the sale of firewood was the only income generation activity, the women mentioned that had helped them support their monetary contribution to the communities' boreholes maintenance, the respondents cannot compromise children's feeding costs and household health insurance for the maintenance of the borehole. This invokes key findings in (Jones et al., 2013) in a study in Malawi, Honduras, and Uganda where the sustainability of rural infrastructure in low-income countries was studied. The study reveals predicting the sustainability of rural water systems is based on the characteristics of the household users, institutional actors, and community end-users. The study concludes that water users' access to water is based on source point unit cost. Water users who fail to contribute towards the cost of O&M are prevented from accessing water. This connects well with (Howard & Bartram, 2003) assertion that the volume of water available to households depends on its accessibility. The findings categorised water accessibility into two. The first one is the time and distance used by

water users, relative to time spent for food preparation and childcare activities at home. From the viewpoint of (Andres, Deb, Gambrill, et al., 2017; Fielmua, 2020; Martin-Candilejo et al., 2020)Andres et al. (2017), the demand-driven CBM system's success depends largely on the ability and willingness to pay for the cost of payment by water users for water services.

7.4.3 Tariff Structure and Ability to Pay for Operations and Maintenance by the Poor

From the field report, the various communities interviewed did not have a laydown procedure for tariff fixation as it mainly depends on their income levels as rural households. The engagement with both the WATSAN members and the women groups in the communities identified unemployment among the citizens, especially women, to be the main challenge that militates against funds mobilisation to support the maintenance of boreholes in the communities. Many of the women, apart from the one-season farming do not have any other sources of income. Most of them have to carry firewood to nearby communities and towns markets to sell to raise extra-income for their livelihood. Savings for this is contributed towards boreholes maintenance.

Although the Nato-Baanuori community benefited from the Nadowli and Kaleo town and community water systems where pipelines are mounted in the community for them to pay before they draw water, lack of income generation ability militated against the citizens' effort to pay for the service as indicated by the community stakeholders. According to the community, it costs an average of GhC 0.30/pan or a big basin for a person to draw water using the Nadowli-Kaleo town and community water system, which to them, is expensive. On the contrary, the engagement with ProNet North (NGO) revealed that there was a need for communities to pay for the water supply as a form of ownership and sustainability measure. The communities however stressed that the monetary contribution to support the post-construction maintenance of boreholes in the

communities is influenced by the kind of jobs they do to earn a living as communities. While the communities indicated lack of jobs for the community members increases the poverty level among the communities, it becomes difficult for the communities to increase the amount of money contributed towards the borehole's maintenance. Therefore, they see employment opportunities such as dry season farming as complementary efforts and income generation systems to help sustain the post-construction management of the community borehole projects. A distressed woman in a focused group discussion in the remote Kpazie Muglu community succinctly put it as follows:

"…we will be very happy if we could get some support to engage in business so that the proceeds, we get from the business will help us comfortably contribute towards the repairs of the borehole…"

"…we should be making periodic cash contributions so that anytime it breaks down we give the men what we have mobilised for them to also add up and repair the borehole…"

"…we can do it (cash contributions) a day after the market day; at least by then people would have sold something in the market and would therefore have some money…"

(Participants in Women FGD, May 2022)

The ability to mobilise financial resources to meet the cost of operating is important. A rural agrarian economy that depends on a seasonal rainfall of only three months is highly challenged when it comes to the point of raising the needed capital for operations. The lesson learned from the study is that water users are very much aware of the need to pay for the cost of repair of broken-down boreholes. When the scheme is "cash and carry" in a poor rural setting, the vulnerable are disadvantaged. This is even more complicated when the existing households as per the water

scheme are small. The ability to mobilise fees in a smaller number of households as compared to a commercially viable one will produce different outcomes. Willingness and ability to pay water tariffs and the size of the amount mobilised depend on the number of households in a community. In a peasant farming environment that largely depends on rain-fed agriculture, periods during dry seasons are difficult for farmers. Other modalities such as in-kind contributions are relatively cheaper as compared to cash contributions.

7.4.4 Transparency, Accountability, Corruption, and Diversion of Contributed Funds

The information gathered during the focus group discussion revealed that accountabilityby WATSAN committee members had been poor. While the amount to contribute is largely dependent on the extent of damage needing repairs, contributions by WATSAN Committee members are often determined by the male group and vary alongside gender. While men contribute GhC10.00 each, women contribute GHC 5.00 only. The expert advice from the DistrictAssembly and CWSA has led WATSAN committee members to open a bank account (at a rural bank in Nadowli-Kaleo District), where all monies collected are deposited and managed efficientlytowards borehole repairs and general maintenance. For example, WATSAN committee members from the Kaluri community bought the borehole spare parts for the community technicians for the maintenance of the boreholes, from their savings account. Thus, there is a transparent accountability system between the WATSAN committee members and the communities.But Yiziri women in a women's FGD stated as follows:

"…we the women here are happy and willing to contribute because …but if we contribute and give out the money anytime, we need it we will not get it. We used to contribute and keep the money in the bank, but people do not want to contribute again because others were deliberately not

contributing…".

(Participant FGD, Yiziri, May 2022)

Communities still follow the original plans given to them by CWSA for generating income for operations and maintenance, with very little or no modification. Although the mode of collecting community contributions remains the same, the low or non-availability of disposable income due to the high poverty levels of the communities is largely regarded as the challenge militating against the success of operations and maintenance of the borehole systems. Despite these measures to improve water availability and accessibility through regular contributions, non-payment concessions are given to certain segments of society, including persons who are not married but can still have access to water for domestic use. Some community members, who have demonstrable ability to pay, yet refuse to contribute, are prevented from accessing water from the borehole. This caused division in the respective communities and quarrels at source points when water users went to draw water from the boreholes. This also demotivated other water users who previously pay for cost of drawing water to refuse to pay or instigate others not to pay for water use. The effect is a reduction in the cash contribution for O & M and subsequently the sustainability of the whole PCS management system.

The issues of transparency, diversion of funds, accountability, and corruption, have been partly shown to be the bane why monitory contribution has dwindled over time. There are also reported cases of diversion and embezzlement of community contributions. Community members cited an instance where monies were withdrawn from the borehole operations and maintenance account, to cover the cost of carting electricity poles from the District Assembly, without the consent of all members. A 55-year-old pastor of a local church commented as follows.

"…people have made up their minds not to contribute again. They were all always contributing, but we have come to realise that it is now some form of punishment; that is why people don't contribute again. If she wasn't able to properly manage our money, we would change her long time. If you are keeping our money, and you don't do your work well, we sack you and nominate a different person."

(Participant Interview, Dambaa, May 2022)

This unilateral decision influenced community members to halt contributions towards the common objective of operations and maintenance. Community members noted that before this setback, there was a general sense of satisfaction with the manner monies are kept and accounted for by those selected to superintend over their contributions. Thus, to address some issues of transparency and accountability, communities suggested instituting a moral system to replace persons who mismanage communities' contributions.

7.5 Spirituality and Indigenous Influence

7.5.1 Traditional Worship and Sacrifice to Lower Deities

Religion, be it traditional or Christian, has always played and continues to play a role in the socio-economic lives of many Ghanaians, including the lives of people in the research communities. The belief in the existence of a supernatural power that is consulted to intercede in the development affairs of communities is common in the social settings of most communities in Northern Ghana. Community members revealed that most sacrifices to the traditional deities relating to water infrastructure have often been a one-off activity, with no periodic follow-up sacrifices. There exists an established religious setup led by the Tindaana (caretaker of the earth god) who superintends

over sacrifices to the deities. These Tindaana must be consulted at regular intervals for sacrifices to be offered to the gods of the land. Thus, beyond monetary contribution, periodic ritual appears not to be adhered to; a likely reason why there has been a drawdown in groundwater or periodic breakdown of boreholes in some communities. In Kaluri in the study area, the head of Nonge Clan confirmed the role played by traditional worship and sacrifices to sustain the function of boreholes:

"..at some time, we the Christians prayed first, and the traditionalists also did theirs. In the beginning, no sacrifice was made, but three days after the borehole was drilled and installed, we could hear the pumping sound of the borehole late in the night when we were all sleeping, so we looked for fowls and performed sacrifices to the gods before that sound stopped. The Tindaana and some elders are the ones who carry out the sacrifices to the gods. Wecannot simply stop tradition like that…"

(Participant Interview, Kaluri, May 2022).

7.5.2 Influence of Local Knowledge and Spirituality

Likewise, the study probed the focus group participants to find out other traditional beliefs such as the importance of sacrifice to the deity to prolong the longevity of the community boreholes as compared to monetary contribution to support the maintenance of the boreholes in the communities. While the WATSAN members and the women groups did not see the need for sacrifice to a deity as an important intervention in terms of the maintenance of the boreholes, it was noticed in the engagement that both men and women see it to be their absolute responsibility to contribute money to regularly maintain the boreholes. This they indicated is paramount and more sustainable than sacrifice to a deity, which is not expected to be a continuous process, but

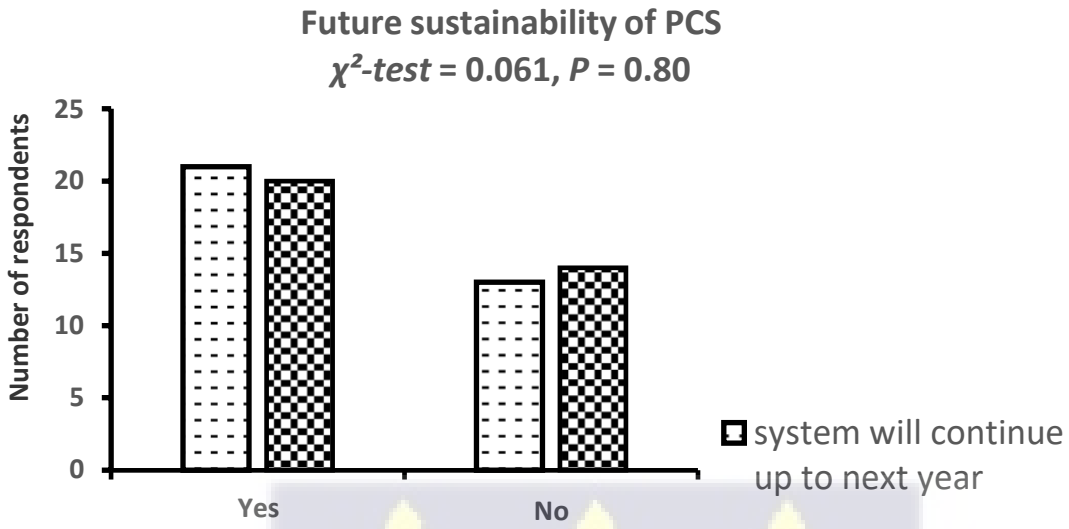
rather done at the initial point of the new borehole's construction. Tradition or indigenous knowledge is developed and adapted by local cultures over a long period through practices, innovations, and experience as a means of supporting community water supply sustainability. In the context of Africa, it is in the form of conventional practices, story-telling, rituals, proverbs, beliefs, cultural values, and communal bye-laws (Borthakur & Singh, 2020). Integration of indigenous knowledge into the policy-making process is important, as its bearers are the best owners of local-specific issues relating to the environment. In essence, a proponent of indigenous knowledge sees the need for indigenous knowledge to be promoted and incorporated into the scientific action of policymakers to ensure perpetuity. This ties in well with (Zvobgo et al., 2022) in their discussions on the role of local knowledge in rural water adaptation responses in Africa. In a comparative study of climate adaptation responses in North, Central West, and Southern Africa, its findings show varying degrees of influence of indigenous knowledge on water conservation management. The study says that the level of household participation in community irrigation systems, rainwater harvesting strategies, water conservation, and ecosystem-based adaptation responses are influenced by the knowledge passed on to them from generations. It however cautions policymakers against the risk of scalability, since indigenous knowledge responses are noted to be highly localised within a specific environment. These findings are well captured by (Imoro et al., 2021) in their discussions on the limits of conventional knowledge in land-use change, and climate change adaptation/mitigation in natural resource management. The study reflects the application of indigenous knowledge approaches in agroforestry conservation, sacred groves use in land conservation, and best agricultural practices that minimises greenhouse gas emissions and environmental degradation.

7.6 Challenges of Demand-Driven CBM and Opportunities for Alternative Model

7.6.1 WATSAN Committee Members' Access to Post-Construction Support System

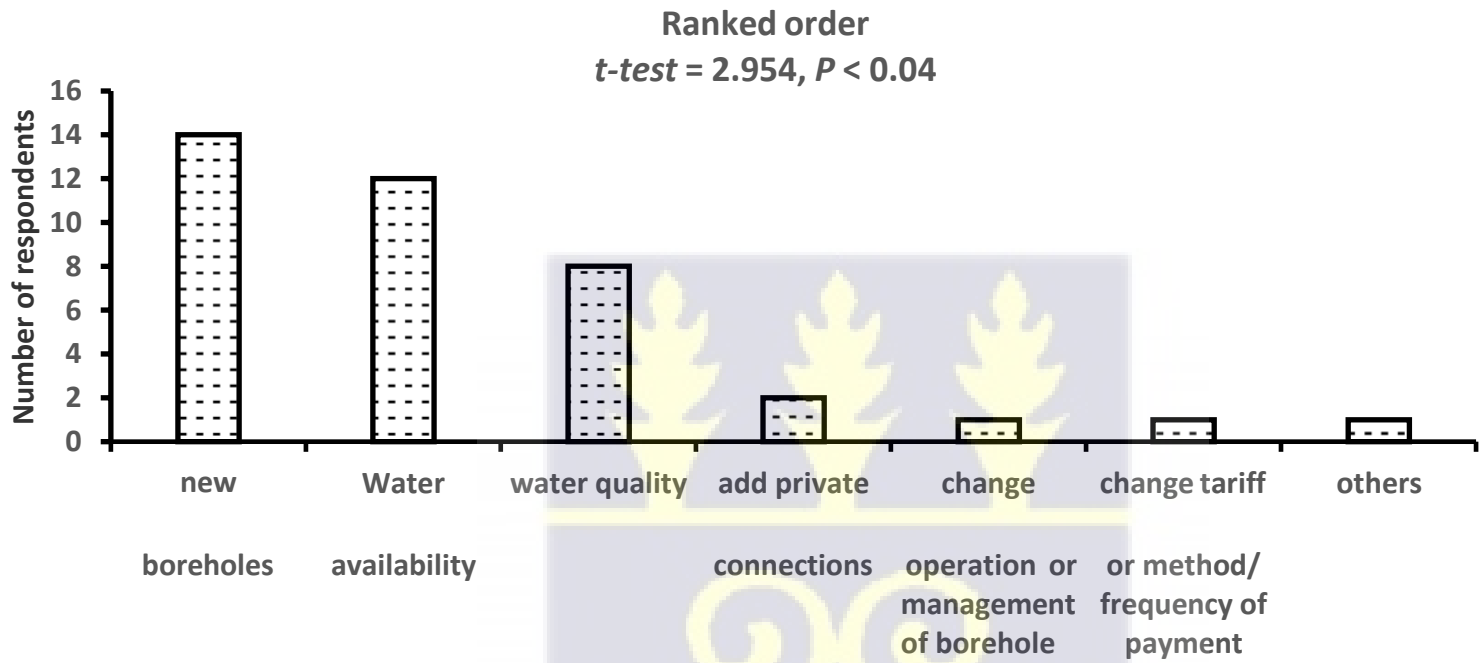
It was observed that WATSAN committee members implemented to the latter the principles of the "wise use concept" of water in the various communities and were directly involved in the day-to-day management of the boreholes and the immediate surroundings. This wise use concept emanated from their concerns about the low level of water that hardly satisfies their domestic needs. For instance, committee members during focused group discussion listed some of their concerns. The key among them include 1). The consistent drop in the water level, even after filling a basin or a bucket; 2). Poor water quality (sometimes water appears reddish and smells bad.) and 3). Difficulties in pumping water out from boreholes. As a result of this setback, WATSAN committee members were not certain about whether the proposed efficient model-based small rural water and sanitation management system will be sustainable, let alone improve on the PCS (Figure 7.10). Even if the proposed model-based small rural water and sanitation management system will be sustainable, WATSAN committee members were of the view that it will not survive beyond 1 year (χ2-test = 0.061, P = 0.80) (Table 7.2). Despite the significant variations (student t-test = 2.94, P < 0.04) in their propositions for the future sustenanceof the model-based small rural water and sanitation program, WATSAN committee members in aranked order listed construction of new boreholes, water availability, water quality, change in operation or management style and method of water tariff collections, as some of the key interventions that may likely improve on the CBM sustainability.

Table 7 1:**Comparative Response of WATSAN Committee Members to Trust in Future Sustainability of SRWSP**



Source: Author's Own Construct, June 2022

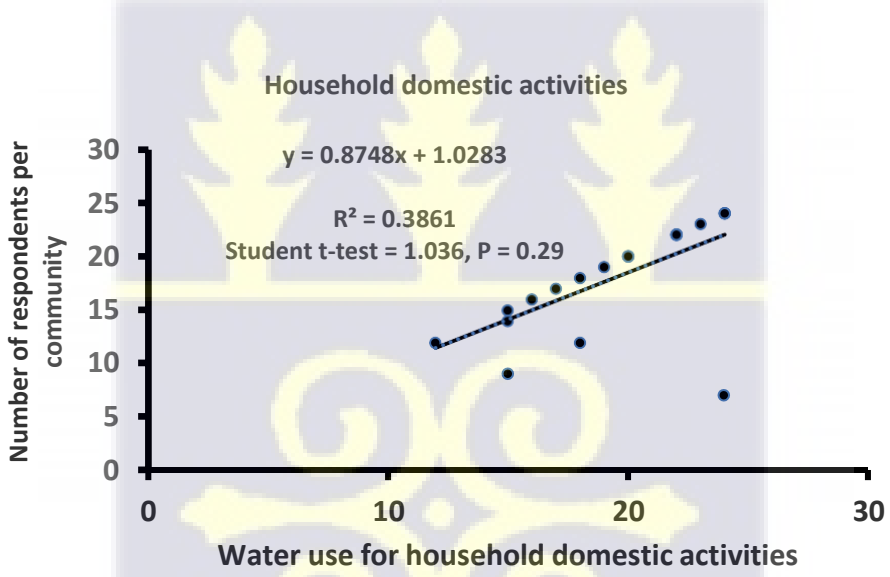
Figure 7. 2: Ranked List of Interventions Requested by WATSAN Committee to Sustain SRWSP



Source: Author's Own Construct, June 2022

These propositions, such as water availability for domestic water use, stemmed from the fact that increased water availability and accessibility (after PCS services) did not substantially lead to an increase in domestic household consumption (R2 = 0.38, P = 0.29) (Figure 7.2). However, the response of WATSAN Committee members indicated a significant and positive impact on SRWSP water supply available and accessible in the past (Student t-test = 24.897, P < 0.0005). It is sustainability was not curtailed by the community-based management, as shown in Figure 6.2. Water use for agriculture in the Yiziri community was the preserve of the male population, especially in the dry season.

Figure 7. 3: **A Regression Graph Showing Level of Domestic Use of Water**



Source: Author's Own Construct, June 2022

7.6.2 Challenges Opportunities and CBM Sustainability

The need for outside groups to support CBM is critical to influencing outcomes in water facilities and use sustainability. As pointed out by (Domínguez et al., 2019), the different barriers to communities receiving external support to enhance facility and management sustainability are

insufficient time available to water committees, availability of hand pump repair tools, and inadequate funds to support community operation and maintenance activities, Under the CBM model the pre-construction phase outcomes, are influenced by the degree of community participation, community familiarity and acceptance of technology used and initial community cash construction and community leadership structure (Bakalian & Wakeman, 2009). External technical support that minimises operation and maintenance costs is required for CBM sustainability. Routine maintenance of systems, technical support to rural end-users of borehole water, recurrent cost sharing, and spare parts access constitute basic inputs that will support effective post-project support (Bakalian & Wakeman, 2009).

This study was focused on the external form of support in a sustained CBM model. The community maintains the water system functioning at an acceptable level throughout its design life without direct external support (Gross et al., 2001). The important attribute of PCS is the ability of the CBM water system to serve community needs with minimum outside assistance, benefits meeting community needs for a longer period beyond project support (Whittington et al., 2009), and providing a reliable service at a desirable level and ability to co-finance by end-users themselves. In the application of the basic principle of community-led Total Sanitation (CLTS), sustainability advocates for outcomes to be determinants of strong community leadership, follow-up support, a well-designed pro-poor financial support system, and all-inclusive participation of all community members.

Some degree of following – up support is needed to achieve borehole functionality. The ability to continue to provide this support depends on resources devoted both from within and outside the community. In the current scenario in the Nadowli-Kaleo District, end-users of one are unable to receive periodic repairs of boreholes until they are broken down and local Government authorities

and State Agencies are institutionalised by Government to support rural water service provisioning are unable to visit once a year or not at all. The study findings confirm those of (Habtamu, 2012) on factors influencing water sustainability that external institutional support in the construction phase of water points is necessary for CBM sustainability. It, therefore, suggests that the policy on clean water and sanitation and post-construction support factually require resources to effectively operate. Notably, continuous follow-up support is, nevertheless, a function of a strong local management entity, and sufficient financial support and technical resources are available to management committees' sustainability of PCS in a water system depending on factors relating to the environment, stakeholders' participation, economic sufficiency, socially equitable and effective institutional organisation (Kleemeier, 2000). Weak external support will eventually lead to a weak performances water system. Neglecting CBO to a few public-spirited committee members weak-performings to monitor systems breakdown is detrimental to CBM sustainability. Committee members' capacity rather than volunteer committee can deliver is required from government, donors, and NGOs to improve and sustain water supply systems.

7.6.3 Level of Community Knowledge in Relationship to Water Systems

Community members' knowledge in budgeting, estimation of expenses, and band record keeping are relevant to sustaining social services. In the assessment of (Hoko & Hertle, 2006), the prominent attributes of knowledge in findings in rural Zimbabwe are four-fold: annual budget to fund O&M, number of skills trainings given to local managers of a water system in the last five years, the existence of saved cash adequate to support O&M and the existence of cash adequate training to support future investment to improve performance of water facility. This is well illustrated in Domínguez et al. (2019) that the consequences of community leaders lacking

knowledge and skills in community mobilisation lead to the community's inability to mobilise the needed funds for recurring expenditures, repairs, and improvement in water systems. Leadership roles are therefore likely to be taken over by community volunteers without any form of training or compensation, and water facility breakdown for longer periods. The communities especially the focus group discussion with women groups and the WATSAN committees revealed the communities have had intensive experiences in working with the local government authorities especially their district assembly in the Nadowli-Kaleo District. While they had such know-how and relationship with the Nadowli-Kaleo District, it has not been effective as the assembly, according to the communities, consistently did not give them the necessary support in terms of their borehole's operation, particularly on the maintenance aspect. To the communities, the assembly and their political parties only visit them during an election year to make empty promises on how to help resolve their communities' borehole breakdown issues but stop visiting them after the political season is over. According to the communities, these are lip services rendered to them, they indicated to be weakening their relationship at the local government level.

7.7 Challenges and Opportunities for a New Community-Based Management Model

The study identified several challenges that affected the small rural water project: even more so with the post-construction support service phase. The key among them include lack of monetary contributions towards the operations and maintenance of boreholes, inadequate training for area mechanics, lack of external funding and technical support, informal selection of members to constitute the WATSAN Committee in the communities, biases against women representation in the decision-making process, lack of accountability of monetary contributions by leaders of WATSAN Committee and limited accessibility to spare parts. Despite these challenges, the

study found some available opportunities for learning in the successful implementation of the CBM model.

7.8 Conclusion

The study found monetary contributions towards post-construction support services and operational maintenance of boreholes as major factors that militated against post-construction services (PCS) sustainability, as against community sensitisation and sacrifices to lower deities. This was due to their inability to raise funds for PCS activities, given their already abject poverty situation. Water user committees were dissatisfied with both technical and financial support received from outside to aid project systems sustainability. The issue of capacity/skills training, especially for area mechanics, was also singled out as one of their challenges. For community water users, the best alternative model to increase sustainability is the introduction of other uses of water apart from just domestic use such as easy access, increased water availability, and agricultural use during the dry season.

CHAPTER EIGHT

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

8.1 Introduction

The purpose of this chapter is to consolidate the findings and conclusion of the study and also highlight its contribution to knowledge. It will also include suggested recommendations that have been identified as challenges to the implementation of a self-supported CBM water delivery approach. The chapter also presents the contribution of this study to already existing knowledge and suggestions for future research. The main purpose of this section is to summarize the major findings and how such findings correspond to the research questions. The study provides answers to four research questions in all. The first one relates to the challenges against the successful implementation of the SRWSP model. The second research question evaluates the way(s) end-users participate in the SRWSP model implementation and how outcomes in terms of the technical and financial capacity of water users' committees towards sustainability are measured. The third research question assesses how community ownership and participation in the CBM model implementation contribute towards sustainability. Lastly, the study determines the potential, challenges, and opportunities provided under the SRWSP-CBM model for the sustainability of rural water supply systems.

8.2 Summary of Results

Research question one assessed how easy or difficult it was to access area mechanics. For accessibility to area mechanics, the majority of water users and WATSAN Committee members in the study area have easy access to area mechanics. Sometimes they rely on local WATSAN Committee members' skills within the community. It was easy to bring area mechanics from outside the community to support facility repairs during breakdown. In respect of

the capacity of area mechanics, 92 percent agreed that the area mechanics invited for facility repairs in the communities acquired adequate skills for the task requested by water end-users. The major challenge was rather the rate of attrition of area mechanics due to death or emigration outside the district area. It was also found that access to borehole spare parts was difficult, 66 percent of WATSAN Committee members said borehole spare parts were inaccessible to them. It was realised that accessibility was hindered by the unavailability of spare parts within NKDA areaand even sometimes outside the Upper West regional capital in Wa. Distance to procure spare partswas varied, but the farthest in proximity was 10km away from the communities. That could explainwhy area mechanics sometimes delay responding to calls to farther communities to do repairs at the request of communities.

Concerning research question two (2) which determined water end-users understanding of the effect of the technical support extended to communities under the CBM model, Pearson Correlation Analysis (PCA) revealed that they were not satisfied with the technical support extended to them. This is confirmed in a PCA (f test = 30.11, $P < 0.0002$, One-way ANOVA test) results. The effect of this was the inability of water user committees to respond early to facility breakdowns, the disintegration of WATSAN Committees due to disagreements and infighting, and the inaccessibility of spare parts and technical persons. The district assembly's role in pre-construction support and provision of water facilities was reduced after installation. The uncertainty relating to religious bodies, politicians, and philanthropist role further makes external support to WATSAN Committees and water end-users weaker.

To address research question three (3) which addressed the level of variation in end- users' participation in CBM activities, frequency in attendance to meetings by the WATSAN Committee, and extent and level of women participation. Female members

participated in CBM activities (student t-test = 3.32, 0.07) more than males. Participation by females rather than males did not give them the free will to impose decisions on men. This is probably because of cultural reasons in the Dagaaba social structure, where decisions are subject to male approval. It was also observed that the frequency of WATSAN Committee members' attendance at meetings was found not to be significantly different (student t-test = 1.98, P = 0.14) in all. The standard accepted frequency of WATSAN Committee members' meetings as specified in the operational manual is once every month. The WATSAN Committee's irregular meetings are the reason for the lack of consensus building in the decision and these subsequently affect committee cohesiveness, and sometimes they even collapse. These outcomes influence PCS flows and CBM sustainability.

Research question four (4) addressed the challenges and militating factors against the implementation of the CBM model. The Principal Component Analysis was used to produce descriptive data to answer the question. Qualitative data was also used, and it revealed six (6) factors as reasons militating against CBM implementation. The challenging factors are borehole repairs, in-service training to end-user committees, sacrifice to lesser deities, the poverty level of households, unfavourable tariff collection structure, and diversion of tariff funds. The PCA ordination analysis revealed ($r = -0.53^*$, $P < 0.05$) and ($r = 0.83$, $P < 0.001$) contributions towards major O & M and minor repairs respectively. The correlation between predictive militating factors against successful CBM implementation is contributions from end-users towards borehole repairs. This correlates well with qualitative data from the field which revealed that the willingness to pay, tariff structure, low household income status, and water users committees/ fund holders' inability to account for funds contributed for repairs as largely the reasons for the challenges associated with CBM implementation in the Nadowli-Kaleo District Assembly. Training services extended

to communities in the pre-construction phase of the SRWSP in 2015 by NKDA, CWSA , and MAFORD did not seem to have provided enough insight to support the CBM model implementation. Further to these findings, communities suggested restructuring the tariff collection formula to not only be "Cash and Fetch" but a contribution of food crops and labour as alternatives. The seasons in the NKDA for tariff collection are not uniform. The harvesting season is a good season for cash contributions. The larger part of the year is dry, with reduced food crop quantities for households. Women are forced to divert from food crop sales to pay water user tariffs to charcoal burning and fuel wood harvesting to supplement household income. These acts are also contributory factors to environmental degradation.

8.3 Conclusion

Actors Capacity to Access Area Mechanics and Spare Parts Four objectives were set to enable the study to answer the research questions. The four research objectives are: 1) find out the effectiveness of external support to the CBM model and how that support stimulates water end-users participation in rural water system management; 2) examine the extent of water end-users participation in the decision-making process regarding water management; 3) investigate the context-appropriateness and added effect of external support (actors/institutions) to CBM water implementation activities; and 4) examine the challenges, militating factors and opportunities provided for implementing the CBM model in the NKDA. The study applied theories, models, and concepts to achieve the above objectives. This section is used to explain how the set of objectives was achieved using the applied theories, models, and concepts in this study.

To achieve objective 1, the study ascertained the influence of external extended support to communities of outcomes in CBM implementation. It was found that access to area mechanics,

skills level of WATSAN Committee members, nearness to spare parts, and skills level or capacity of area mechanics influence outcomes in CBM implementation in rural communities. These are identified non-material resources as shown in the analytical framework of the study in (Chapter 4.7.4) which are lacking to support CBM sustainability. Sustainability is about the use of natural resources that are found within the local environment, not financial resources that the market cannot support. Sustainability is driven by the community, state, and stakeholders' support for a longer time. The expectations of communities turned out to be a mirage as firstly, contrary to the principles of community management, communities are expected to be self-reliant by having greater control and responsibility to deliver services. In some instances, it advocates for partnership in areas where private sector participation is introduced with the hope of bringing in new technology, expertise, and funding to improve efficiency. Community-Based Organizations (CBOs) in a CBM are expected to empower, enforce, and sustain service delivery.

Secondly, in the principles of the Principal-Agency Theory, the agent both the principal (donor/Local Government) and agent (CBOs/Private Sector Providers) have an interest, but the agent is in the sole interest of the principal. That explains why the best agent must always be chosen and, secondly, the principal must always monitor to ensure best practices are employed by the agent in the performance of their duty. In the case of NKDA, external support from funding agencies and LG could not be monitored to ensure efficiency and effectiveness in providing technical support services to water user committees.

8.3.1 Water Users Ownership and Participation

The study achieved research objective two (2) with the ability to ascertain how end-users of water own and participate in the management of borehole facilities in the study area. Unlike the accepted

practice of WATSAN Committees meeting once every month, it was realised that the majority of them met irregularly when they must do so. Women participated more than men most times when the committee decided to meet. The participation of men was not as poor as expected. This outcome in the conduct of women confirms the claims of the Theory of Planned Behaviour, which sees behaviour and volition to act in a particular manner to be of individual influence and subject to norms. In the rural social structure of the Dagaaba ethnic group in the NKD area, gender roles are defined based on norms and beliefs, and women are accepted as "drawers" of water for domestic consumption and other social provisioning. The Theory of Planned Behaviour contends that beliefs influence the individual desire to perform, capabilities, and strengths of behaviour. Women see making water supply sustainable as a responsibility, and as such an act of volition. It is therefore not out of place that the recommended representation of women in water committees and especially WATSAN Committees, CWSA, DWMT, and donors is for not less than 40% at all times.

8.3.2 The Added Effect of Technical Training to Support Community-Based Management

We measured the context appropriateness of the technical support extended to WASH committees intending to sustain CBM implementation by ascertaining the kind of Post- Construction Support services most needed by the WATSAN Committee. Four (4) support mechanisms were identified, namely the accessibility to external support to upgrade the water facility, accessibility to external funding, access to external funding to support management and administrative services, and access to external funding to support area mechanics. Accessing funding for the cost of repairs was identified as difficult. Repairing major breakdowns is a challenge because of the response of water end-users to calls for financial contributions toward operations and maintenance. But above all these challenges were increased capital to enable communities to upgrade or replace the water

system completely. Unlike other training which was probably given by the WATSAN Committee at the time of project implementation, raising capital for the complete replacement of the system was a task that community members and WATSAN in particular found difficult.

8.3.3 Challenges Against Community-Based Management Implementation

Research objective four (4) was achieved after the study determined the factors that militate against the sustainable implementation of the CBM model of water delivery. Monetary contributions towards operations and maintenance came up top, while community sensitisation came down last, for factors that militate against the CBM water system. The study identified the lack of business potential as a reason for the inability of water consumers to contribute towards post-construction water delivery services. Discussions suggested that the tariff structure needed to be explored to allow for the poor and vulnerable groups to contribute. There were suggestions that market days be accepted as days to collect water tariffs. The willingness to pay by water users was positive, except for the fear of fund diversion and corruption by members who keep funds contributed for repairs. Indigenes proposed the introduction of other programmes that are capable of improving the income levels of the people. It was clear the subsistence system of agriculture was not enough to sustain cash contributions for facility repairs. This called for a need to redesign the in-service training given to community leaders and water managers to include water resources management. People in the community and those tasked with the responsibility for keeping funds were to be monitored to prevent fund diversion. Diverting funds and the inability of the community to access it for repairs is a major disincentive to members' refusal to pay for water services.

8.4 Theoretical Implications on the sustainability of the Community-Based Management model

The expectations for the CBM model to be sustained to enable rural water end-users to have access to constant water supply with the established public sector is presumably miscalculated. The bureaucracy established and delegated to deliver services with responsibilities that were ill-equipped with the right capabilities was wrong. Studies carried out in many jurisdictions, and in this study in particular, show that the public sector faced many challenges in implementing public programmes. Water is a public good and as such is recognized as a service that must be made available to every individual. The results of the current study make it clear that the institutions and actors of the state failed to sustain the CBM model benefits. The hope of CBM model sustainability in the medium to long term means the implementation of an alternative model instead. The alternative is the result of the participation of the private sector in the provision of services such as borehole repairs and the sale of spare parts. However, it is realized that the participation of the private sector (market) doesn't naturally make such changes efficient because of the reactionary forces inherent in the marketplace. The cost of traveling to access spare parts is higher, and exchange rates make the prices of spare parts also higher and beyond the ability of communities to access these parts. It therefore suggests that there exist inefficiencies in public service. These inadequacies and efficiencies are popular at the local government level, and as such cannot be resolved by the private sector in the short to medium term. These suboptimal outcomes in service provision are a result of the self-centred interest of policymakers, who usually lack the incentives to act in the best interest of the public.

Community participation connoted ownership and participation in the supply of services to its people. The 'publicness' of water as a consumable failed to address the collective action problem of communities. Although community ownership is promoted as an alternative to centralism and

a top-down approach to service provisioning, there still exists a high motivation for end-users to free-ride at the cost and detriment of community contributors. The results of free-riders in any management model are poor operations and maintenance, lack of community cooperation, and the risk of system failure in the future.

The intention to actively participate or perform a certain behaviour is influenced by three factors, which are (a) individual attitude towards a policy obtained. In other words, it is the end-user's willingness to accept the policy option; (b) individual subjective norms that are exerted on them by an external force to accept the policy option, and (c) the individual perceived behavioural control. This is measured by assessing the level of comfort, difficulty, and challenges with compliance with the policy option. This study shows that end-users of community water supply accepted the responsibility to manage their own water system. The social structure, however, puts much of the burden on operations and maintenance on women than men. Community ownership is accepted as a policy option but taking control of operation and maintenance is a challenge. Attendance to community meetings to make decisions on water facility maintenance are attended more by women than men. Expected pressure from community leaders is mixed, as in some instances, assembly persons and chiefs veto decisions pertaining to community maintenance of water systems. On the variable of selection of water facility managers, (WATSAN Committee members) community leaders' exertion of authority is considered dictatorial, undemocratic, and gender-biased in favour of men. In the current study, the degree of social pressure on water users to participate in the policy option of a community-based management system is controlled by community leaders who are sometimes despotic. The consequence of this is a one-sided decision taken by men and women's voices rather suppressed. This is the outcome of agreed decisions made by the community and the manner through which these decisions are communicated as policy

options for implementation. The level of comfort of consumers of these decisions is reflexive of the level of compliance. They suggest that attitudes and subjective norms affect the behaviour of end-users to conform with guidelines governing participation in CBM implementation.

Understanding the influence of institutional reforms and the needed resources available are clearly constraints. Water facilities under the CBM arrangements haven't rendered the needed support for its sustainability. The study anchored on the three pillars of institutional change. They are regulations that emphasises community conformity to set up rules in project implementation. Rules such as frequent attendance to meetings, the ability to pay for tariffs for borehole repairs and maintenance, and giving more role for women participation in water facility operation and maintenance is important for community cohesion. Although women's participation wasn't curtailed in the CBM water supply programme, they often lack the courage to make independent decisions regarding O & M in the absence of their men counterparts. The study enables us to understand the challenges of implementing O & M policies within a social structure where men are seen as heads of families. Attendance at meetings to discuss O & M activities is not optional for either men or women. Women use water more in their domestic activities than men. In O & M implementation, women participated more than men for the reason that they needed water more than men. That is to say that the risk of borehole breakdown affects women than men. But major decisions are not taken without full consultation with men, here the moral base to accessing legitimacy by actors of the lower spectrum of CBM implementation is difficult to enforce.

The regulative roles of state institutions in enforcing rural water supply implementation are a challenge because of the lack of financial and human resources. Communities are not able to have

the needed interaction for a sustainable rural water implementation plan. The facts suggest that community involvement is still plagued by bureaucratic paralysis, inefficiencies, and difficulties in accessing finance. The study recognized local funds mobilization challenges for the operation and maintenance of the CBM water system. The policy as it stands now requires a full cost recovery in O & M in the post-construction phase but is weakened as resource mobilization is deficient in communities Even in instances where the community and end-users are willing to contribute towards O & M, local managers of funds have the responsibility to be accountable and efficient in funds management. The legitimacy of institutions is not in question with respect to programme implementation; the regulatory framework is also clear and codified for easy reference. The task is the ability to finance a full-cost implementation of the operation and maintenance of the CBM water project.

The present institutional framework for the implementation of commonly based management of rural water supply is all influenced across the pillars of institutionalism. It is indicative in the data that there is a low frequency of regulative influence on the CMB model policy. In CBM implementation, training and refresher training in borehole repairs contribute to the sustainability of the CBM model. Normative, and cultural-cognitive factors are embedded in the social structure of the study area. The inability of these factors to influence water facility management was because of the complex socio-cultural dynamics in place. Women are accepted as wives, and discussions between them and men on water governance are suppressed. Ghana's local government is not supported to engage local communities in project implementation

8.5 Recommendations

Recommendation for Donors in Rural Water Supply Delivery Development partners, donors, and the Ministry of Water and Sanitation should jointly develop an alternative model that will take into consideration the social structure of each recipient community of the water supply system. An alternative model must always meet the criteria to conform with the national water policy framework, measurable outcomes in terms of natural standards, and its ability to meet the needs of future users. We assumed all communities to be uniform because they are located in the same geographical area. These mislead donors in their decisions on programme design and this results in disappointing results for stakeholders.

8.5.1 Recommendation for Community Water and Sanitation Agency

The consensus currently emerging stresses the need to strengthen institutions is not necessarily the panacea to effective CBM and sustainability. Improving water sector service delivery requires a form of mechanism that ensures better sector coordination of actors in the rural water supply sector, information exchange, and human resource building through capacity development. This coordination should be given to the CWSA to perform. Effective institutional coordination should equip water sector actors with skills to improve the sustainability of the CBM system. Although the laws establishing agencies and institutions to facilitate rural water supply are clearly stated, resources to implement policies and legislations are far-fetched. Unclear rural water sector framework coupled with ambiguous legislation in roles of actor influence outcomes in Rural Water Sanitation sources. The Community Water and Sanitation Agency Act promulgated by parliament needs to be amended to give the agency the resources to function beyond the regional capitals. To function beyond regional capitals implies decentralizing further to the district levels, where their

services are much more needed. There is the need to increase financial resources to CWSA to enable them to be more supportive to rural WATSAN Committee members. With more financial resources to CWSA and with decentralized offices in each district capital, continuous training of community WATSAN Committee members and area mechanics will improve.

8.5.2 Recommendation for District Assembly

Local government authorities should prioritize policy reforms against simple mitigation measures. Ghana's local government allows for easy legislation for reforms at the local level. Policy reforms on the roles of donors should clearly define the roles, responsibilities, and procedures that will regulate and coordinate the activities of water schemes. The reforms should recommend a continuous support mechanism to communities for a long time, as we have seen after the construction of the water facility. District Water and Sanitation Officer (DWSO) is more appropriate to supervise and enforce regulations consistent with the laws of the country. With the right resources, local government authorities should build local capacity to support post-construction support sources.

8.5.3 Recommendation for Ministry of Water and Sanitation

The Ministry of Water and Sanitation Creating an enabling environment to implement a sustainable PCS is not without the operationalization of the appropriate regulatory regime. This must include policy framework, legislation, practices/norms, and financing regime that determine the decision-making process. Ghana's policy framework for rural water delivery is under the supervision of the Community Water and Sanitation Agency. It is clear to reasons that the Community Water and Sanitation Agency with its facilitatory role for the provision of safe water and related sanitation services to rural communities is undermined by the non-existence of the

offices in only regional offices all around the country. Community leaders and water committees need to be engaged in the systematic monitoring of projects to ensure accountable and sustainable delivery of services. This is more acceptable when community leaders are selected by their people.

8.5.4 Recommendation for Water End-User Committees

WATSAN Committees should act like true CBO and enter into partnerships with other actors at the community level. This is the reason CBOs must get into a partnership arrangement with local government authorities to enable them to deliver on their mandate and support development work. It is unimaginable to expect CBOs or WATSAN Committees to meet all global and national critical standards in service provisioning. The reason is simple - CBOs cannot deliver output at their maximum best. CBOs are also encouraged to increase their political bargaining power by forming alliances, be it temporarily to demand reforms in legislation and regulation that are impediments to their success. Forming of alliance by WATSAN Committees to exert more influence in the public policy-making space and building public opinion and general support fromthe public to patronise their services is important. In partnership arrangements, CBOs should bargain on equal levels irrespective of cultural, economic, or political differences. This serves the partnership interest better and also sustains its gains. Households should be given the preference to choose whom to manage the user fees of boreholes. Incentive packages should also be put in place for people in the community who cater to water facilities. There is a need to incorporate localexpertise and community volunteers are required to combine the technical capacity of a community-based management scheme.

8.6 Contribution to Knowledge

The relevance of this study and its contribution to knowledge was the task set out in this study. First and foremost, the success and sustainability of rural water systems are based on the kind of

model used. Earlier studies focused on community-managed water systems as a solution to sustainability in itself, than a springboard to achieving sustainability when the fundamentals are wrong.

Secondly, the "community" is identified as homogenous without looking at its real attributes. The ability of household heads/spouses' ability to respond to a community request to contribute towards the cost of operation and maintenance. The current tariff policy for drinking water supply is the flat rate system. In this system, the income levels of households are not considered. The poor are not able to pay because of their inability to afford its cost. Data on household income levels do not immediately exist, but there must be a way out for those who cannot afford to have access to safe drinking water.

The study revealed that women's inability to pay cash for O & M is as a result of their low-wage off-farm income status caused by a long non-farm dry season. It is clear that low-income levels of women caused by low-wage non-farm incomes in rural areas have a substantial positive effect on general household incomes and affect water users' contribution towards payment for water tariffs. This influences the sustainability of water facilities in communities.

Households in NKD are heterogeneous, and it reflects the different strategies each adopts as a coping mechanism to support Operation & Monitoring activities. The sources of income and income-generating activities of each household differ significantly. Their household assets endowments, income levels, and entitlements also vary between men and women. A larger amount of income from rural agrarian households is obtained from food produced for in-house consumption and agricultural wage labour. Overall, household agro-based income levels decrease with the agricultural season. In essence, income obtained from the sale of agricultural produce

from subsistence agriculture is not a good predictor of the ability to pay for water tariffs in the rural community.

8.7 Areas for Further Research

There are several ways to extend the line of research in the rural water supply system, especially the CBM model. As revealed in this study, the CBM model in the rural water supply system is confronted with many challenges. This study has revealed potentially important insights relevant to policy reforms. This study has identified three areas for further research.

These are:

a. The study suggests that the methodology should be replicated in a similar community, with a focus on boreholes that did not receive any pre-project implementation protocols. Boreholes/hand pumps provided by individuals and institutions without prior training and establishment of water user committees. It is critical to know how these boreholes confound community management models and how it affects the sustainability of both kinds of boreholes. In this study, prominence should be given to both treated boreholes (demand-driven planning and project planning protocols) and those "philanthropist" boreholes that followed the supply-driven protocols.

b. The review of the relevant literature and findings revealed the willingness of water users to contribute towards operation and maintenance. There is extensive knowledge among rural water users wishing to contribute to project maintenance. However, the burden of cash contribution is weighing against the willingness of water users to pay water fees. The study expected water users to easily contribute towards maintenance. It is important to identify the incentives for willingness to pay.

Future studies should also explore the community commercial viability factors that influence water users' ability to pay for water use. In the current study, water users' response to the burden of cash contributions towards O&M was found to be seasonal. The livelihood support systems and safety nets that support poor, agrarian economies must be investigated. What are the coping mechanisms that support sustainable livelihoods that will help engineers and development planners identify the right model relevant to making an impact in the rural water supply sector?

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Appendix

UNIVERSITY OF GHANA

Appendix I

Protocol Consent Form

Ethics Committee for Humanities (ECH)

PROTOCOL CONSENT FORM

Section A- BACKGROUND INFORMATION

Title of Study:	INSTITUTIONAL ARRANGEMENTS, ACTORS AND OUTCOMES IN COMMUNITY-BASED MANAGEMENT MODEL OF DRINKING WATER SUPPLY IN RURAL GHANA: A CASE STUDY OF NADOWLI-KALEO DISTRICT
Principal Investigator:	**Stephen Yir-eru Engmen.** PhD Candidate. Institute of Statistical, Social and Economic Research ISSER. University of Ghana, Legon. P. O. Box LG 74. stephenengmenn@gmail.com
Certified Protocol Number	N/A

Section B– CONSENT TO PARTICIPATE IN RESEARCH

General Information about Research

The overall interest of this study is to investigate the important role actors' play to sustain rural water supply systems, to be specific borehole fitted with handpumps within the context of the Community-Based Management model. The study is purely an academic exercise that is intended to help **Stephen Yir-eru Engmen**, who is a PhD candidate/researcher to present his dissertation to the University of Ghana's Graduate School as part of his requirements for the award of a PhD.

This study will engage you for approximately between 45 minutes to 1 hour.

If you agree or choose to take part in this study, we will ask you a few questions relating to water services and management (boreholes) in your village.

Benefits/Risks of the study

We don't expect any risk during this study if you choose to take part in it. If we happen to know of any risk, we will immediately let you know of it. We also don't expect you to, as an individual or in groups to benefit in any way from this study. We see it only as purely a voluntary academic exercise.

You are allowed to withdraw from this study at any point if you wish to do so. Any data relating to your participation in this study will be destroyed if you decide to pull out from this study.

The information given out as a result of you taking part in this study is intended to improve borehole operation and maintenance in your village. This will enable individuals and the entire community gain more insight into putting your boreholes operation and maintenance system working for a longer time.

Confidentiality

Confidentiality and privacy of participants will be protected during the study.

Confidentiality will be strictly observed in reporting and dissemination, personal identification, and publication of respondents' information.

For instance, paperwork on Focus Group Discussion (FGD) and other relevant data from household survey will be stored and protected for at least 3-4 years.

Participants will also be advised not to disclose in detail to others about what we discussed during interviews and Focus Group Discussions.

Compensation

There is no expected known direct risk or benefits to participants who will participate in this study because of the subject matter involved.

The study only expects that information given during this study will help build on policy on sustainable operations and maintenance of boreholes fitted with handpumps in villages.

In this case there can be some indirect benefits to your village, country, and policy enrichment at large.

Withdrawal from Study

Participation in this study is purely voluntary and you may choose at any point of this study not to be part without any cost or penalty awarded.

All data obtained from you during this study will be destroyed and your name(s) won't be mentioned anywhere thereafter if you choose to redraw from the study.

Contact for Additional Information

If you have any questions about your rights as a research participant in this study you may contact the Administrator of the Ethics Committee for Humanities, ISSER, University of Ghana at ech@ug.edu.gh or 00233- 303-933-866.

Section C- PARTICIPANT AGREEMENT

"I have read or have had someone read all of the above, asked questions, received answers regarding participation in this study, and am willing to give consent for me, my child/ward to participate in this study. I will not have waived any of my rights by signing this consent form. Upon signing this consent form, I will receive a copy for my personal records."

_____

Name of Participant

_____

_____

Signature or mark of Participant Date

If participant cannot read and or understand the form themselves, a witness must sign here:

I was present while the benefits, risks and procedures were read to the volunteer. All questions were answered and the volunteer has agreed to take part in the research.

_____

Name of witness

_____

_____

Signature of witness/Mark Date

I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual.

_____

Name of Person who Obtained Consent

_____

_____

Signature of Person Who Obtained Consent Date

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INSTITUTIONAL ARRANGEMENTS, ACTORS AND OUTCOMES IN COMMUNITY-BASED MANAGEMENT MODEL OF DRINKING WATER SUPPLY IN RURAL GHANA: A CASE STUDY OF NADOWLI-KALEO DISTRICT

Appendix II

Key Informant Interview Guide

Interview ID----------

Hello. My name is Stephen Yir-eru Engmen, a doctoral student of the University of Ghana. I am currently conducting a study of water supply systems in rural communities of Ghana. My research is entitled "Community-Based Management of Drinking Water Supply in Rural Water: Actors, Institutions and Outcomes for sustainability". The goal of the study is to learn how to create sustainable rural water supply systems. We are particularly interested in boreholes that were built in the Nadowli-Kaleo district as part of the World Bank [IDA-CR. No. 47890] Sustainable Rural Water and Sanitation Project. All information I collect will be kept confidential. I am not going to write your name anywhere on this after this interview. If there are any questions you do not know the answer to, or you prefer not to answer, just tell me and I will skip over them. Would you be willing to answer our questions?

Introduction

1.1 What is your current position? (WRITE THE RESPONSE BELOW)

1.2 What is your current place of work or institution/position held? (WRITE THE RESPONSE BELOW)

1.3 What knowledge do you have about the World Bank/SRWSP planning, construction and implementation in the UWR?

1.4 From your personal knowledge and experience in the SRWSP, what are the **most effective strategies** for a sustainable, pro-poor, rural community water projects implementation?

1.5 From your personal knowledge and experience in the SRWSP, what are the **least effective** O & M activity in the rural community water delivery?

Actors

2.1 In your opinion, how does the current institutional arrangement (actors) support rural water supply sustainability in terms of the set objectives of SRWSP?

- How does the institutional framework in rural water supply projects operate today?
- What do you think their key roles play to support Operations and Maintenance?
- Are there any known existing diversities among these actors that work **for or against** O & M sustainability? Please, state them if you know of any.

2.2 Do you have thoughts and ideas as to how linkages between/among institutions (actors) work out as a strategy to affect Community-Based Management of SRWSP? Can your response be specific on Post-Construction Support phase?

2.3 In your opinion, are there any known combined value effects (outcomes) in terms of the different roles of actors in sustainable PCS services? Why do you feel that way? Can your responses be in respect of these combined value effects make specific references?

3. Challenges

3.1 What special challenges does trying to implement a sustainable PCS services in rural water and sanitation project (SRWSP) present in recent times? (State challenges, if there are any).

A. What do you think are the greatest **obstacles that successfully minimize potentials** in sustainable PCS in borehole water supply projects in rural areas? Why do you feel that way?

B. What do you think are the key **interventions** to overcome sustainability challenges associated with Monitoring Operations and Maintenance (MOM) of rural water projects?

C. In your own opinion, what suggestions do you have that we might apply to meet these challenges?

3.2 In your opinion, have the relationship, linkages or partnership among these institutions/actors above contributed to sustainable O & M services in rural water projects? What are your reasons?

Effectiveness

I will be asking you questions relating to the context-appropriateness and effectiveness of the Technical Training Support (TTS) services provided by stakeholders with the aim of strenghening O & M services and how these play out in the application of Community-Based Management Model (CBM) in rural water projects.

4.1 In relation to previous responses, what opportunities are created for water users at all levels to participate in the decision-making process during SRWSP implementation, especially at the Post-Construction phase?

4.2 To the best of your knowledge, how would you assess the kind of support provided by **decentralized state and non-state institutions** in terms of O & M? How should these institutions be well positioned to support sustainable O & M systems within the context of the Community-Based Management (CBM) Model in rural water supply?

4.3 The Community-Based Management (CBM) Model places more emphasis on water users/community control and ownership of water systems. Challenges still abound, especially in poor, rural communities. To the best of your knowledge, what suggestions do you propose in terms of how we might sustain the following O & M services to strengthen the Community-Based Management (CBM) Model in rural water supply?

A. Technical assistance to community water users;
B. Refresher training to village water committees;
C. Continuous monitoring and data collection; and
D. Coordination, facilitation and linkages between community and private sector;
E. Prevalence of poverty and the need for water users to pay for O & M services.

4.4 What are the institutions/actors that must be involved?

5. Others

5.1 Can you propose an alternative to the current CBM-Model with which WATSANC are leaders of handpumps water supply? What do think can **improve** and **sustain** O & M activities in a rural environment of high incidence of poverty.

Thank You.

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Appendix III

Household Questionnaire

SECTION 1: General Introduction

Hello. My name is Stephen Yir-eru Engmen a PhD student of the University of Ghana. I currently conducting a study of water supply systems in rural Ghana. My research is entitled "Community-Based Management of Drinking Water Supply in Rural Water: Actors, Institutionsand Outcomes for sustainability." The goal of the study is to learn how to create better rural water supply systems. We have chosen to come to_____***(Community Name)*** because you had a water supply system installed in ***2015*** under the SRWSP-World Bank project. The results of this survey will be kept confidential. I need to write your name and address on this form so that the lead researchers can verify I visited your household. However please noticethat this form is being kept separate from the main part of the survey – your name will not appear anywhere on the main survey. We would like to talk to the head of household (and/or the spouse of the head of household) about the water supply system in the village and about how your household obtains water. Is there someone who makes financial decisions and/or collects water for the household?

Researcher/Enumerator: *Ask for the interviewee's name and address; fill in the information in the cells below.*

Interviewee:_____District Name: _____

Address: _____ Village Name: _____

Time Start: _____ GPS Coordinates----------

Before we begin the survey, I need to ask you some quick questions to make sure you are eligible to complete the survey and to make sure you are willing to complete the survey. If you do not want to answer my questions, you do not have to.

1.1 Would you be willing to answer our questions? We expect the interview to take about 20 minutes.

☐ ***(0)*** No_____***(If no, stop).***
(1) Yes _____

A. Socio-demographic Characteristics of Respondents

1. Age of respondent..... years.
2. What is your occupation? 1. Farming 2. Salary worker 3. Artisan 4. Unemployed 5. Others (specify) …….
3. What is your marital status? 1. Married 2. Single 3. Widow/Widower
4. Gender 1. Male 2. Female
5. What is the average income of your household per every month? ..... Ghc
6. How many people live in your household? ……

1.2 Are you the head of household or spouse of the head of household?

☐ (1) Head of household _____
(2) Spouse of head of household _____
(3) Other ***(ask for head of household or spouse and begin again. STOP if head of household or spouse is not home.)***

B. Relationship between Post-Construction Support (PCS) activities and sustainability of Rural Water Supply (RWS)

1.3 In 2015, handpumps were installed on new borehole(s), and water began to flow from SRWS Project (***describe project***). Were you here in ***(2015)*** when this system was built?

☐ **(0)** No / can't remember_____***(If no, stop – ask if spouse is available and continue with spouse if applicable. Stop if neither is available).***
(1) Yes _____

1.4 Are you aware of (Have you heard about) this water supply project? *Please obtain agreement about the project in the village.*

☐ **(0)** No / can't remember_____***(If no, stop).***
(1) Yes _____

1.5 Are you or anyone in your household a member of the current Watsan committee?

☐ (0) No / can't remember_____
(1) Yes_____(***If yes, STOP).***

1.6 List the activities undertaken after the construction of the RWS?

……..
……..
……..

1.6 How do you rank the relevance of the above activities to the current water supply system

1.7. Are you a member of any committee in the community? 1. Yes 2. No
1.8 Have you received any external support to help maintain the water supply system? 1. Yes 2. No
1.9 If yes to Q1.8, what form of support is it? 1. Financial 2. Capacity building training 3. Technical 4. Others (specify) ……
2.0 Which sector supported you? 1. Government 2. Self-Help 3. NGO 4. Others (specify) …….
2.1 How often do you received this support? 1. Weekly 2. Monthly 3. Annually 4. Others (Specify)……

C. Added effect of a "demand driven" post-construction support approach on community-based water management sustainability

2.2 Do you always request for support to maintain the system? 1. Yes 2. No

2.2 If yes, how often do you make a request? 1. Weekly 2. Monthly 3. Annually 4. Others

(Specify)……

2.2 How do you usually make a request for support? 1. through a chief 2. Through an Opinion Leader

3. Through District Assembly 4. Through an Assemblyman/woman 5. Others

(Specify)…….

2.3 How do rank the extent of the support you receive? 1. Highly strong 2. Strong 3. Normal

D. Effectiveness of end-users of water supply systems and the impact of technical support (PCS) provided by actors

2.4 What do generally use water from the RWS for? 1. Household Domestic activities 2. Agricultural Activities 3. Construction 4. Others (Specify) ……
2.5 Do you have other sources of water apart from the RWS? 1. Yes 2. No
2.6 If yes, please specify. 1. Borehole 2. Dams 3. Well 4. Dugouts 5. Others (Specify) ……
2.7 If you use the borehole, how often? 1. Everyday 2. Weekly 3. Monthly 4. Annually 5. Others (Specify)…….

2.9. Why would you not use the borehole?
a. _____Too expensive relative to other sources (1 if checked, 0 otherwise)
b. _____Do not like payment system (1 if checked, 0 otherwise)
c. _____Poor quality/taste relative to other sources (1 if checked, 0 otherwise)
d. _____Not working now (1 if checked, 0 otherwise)
e. _____Unreliable relative to other sources (1 if checked, 0 otherwise)
f. _____Too far away relative to other sources (1 if checked, 0 otherwise)
g. ____Conflicts with neighbors/other users (1 if checked, 0 otherwise)
h. _____Other (please specify) (1 if checked, 0 otherwise)
_____

2.24. If you draw water from a borehole, which is the borehole that you use **most** often?
_____SRWSP #1 (1)
_____Other Borehole #2 (2)

2.25. How long have you been using this borehole?_____months

a. _____years

b. _____Since it started operation (1 if checked, 0 otherwise)

c. _____Since I came to the village (1 if checked, 0 otherwise)

d. _____Can't recall (1 if checked, 0 otherwise)

2.26. What was your **primary** motivation for switching to this borehole from other sources that you once used?

_____Convenience / reduce travel time (1)

_____Better quality (safety, taste, smell, color) (2)

_____More reliable (3)

_____Lower cost (4)

_____Other source no longer functional / dried up (5)

_____Other (specify…) (9) _____

2.27. Is there another borehole closer to you?

_____No (0) *(skip to 2.29)*

_____Yes (1)

2.28. What is the **primary** reason you do not use the borehole that is closer to you as often?

_____Broken (1)

_____Poor quality water (2)

_____Harder to use (3)

_____Hours of operation (4)

_____Long waiting times (5)

_____Don't like attendant policies (6)

_____Unreliable (7)

_____Conflicts with other users (8)

_____No water in the dry season (9)

_____Other (99) (specify:_____)

2.29. Is there an open well closer to you?

_____No (0) *(skip to 2.31)*

_____Yes (1)

2.30. Why do you not use that open well instead of the borehole?

_____Broken (1)

_____Poor quality water (2)

_____Harder to use (3)

_____Hours of operation (4)

_____Long waiting times (5)

_____Unreliable (6)

_____Conflicts with other users (7)

_____No water in the dry season (8)

_____Other (specify) (9)_____

Changes in Operation of Borehole

Type of change	a. Has there been.	b1. Did this lead to…	c. When did the change take place?	d. Was this an improvement, a deterioration, or did it not matter?
2.31 Any change in hours of operation?	__No (0) __Yes (1) ___Unsure (9) *(skip to 2.32 if '0' or '9')*	_____longer hours of operation (-1) _____shorter hours of operation (1) _____same number of hours but different schedule (0)	Year: _____	__Improvement (1) __Deterioration (-1) __No Difference (0)
2.32. Any change in the system of payment?	__No (0) __Yes (1) ___Unsure (9) *(skip to 2.33 if '0' or '9')*	_____pay as you fetch (1) _____pay when repairs are needed (2) _____pay per month or year (3) b2. What payment system was in place originally? _____there were no payments (0) _____pay as you fetch (1) _____pay when repairs are needed (2) _____pay per month or year (3)	Year: _____	__Improvement (1) __Deterioration (-1) __No Difference (0)

2.33. Any new system of managing the borehole (such as different attendants, caretakers, or watsan members?)	__No (0) __Yes (1) __Unsure (9) *(skip to 2.34 if '0' or '9')*	_____installed a new attendant (1) _____installed a new caretaker (2) _____installed a new watsan (3) _____no longer an attendant (4) _____no longer a caretaker (5) _____no longer a watsan (6) _____other (9)	Year: _____	__Improvement (1) __Deterioration (-1) __No Difference (0)

2.34. Since you have been using this borehole, how many times can you recall the borehole not being functional due to either a break down or a water shortage? Would you say…*(read responses)*
_____never (0) (*skip to 2.39*)
_____only once (1)
_____about once a year (2)
_____a few days per year (3)
_____about once a month (4)
_____about once a week (5)
_____Can't recall (99)

2.35. Has the borehole ever had water shortage problems (e.g. borehole was dry)?
_____Yes (1)
_____No (0) *(skip to2.37)*
_____Not sure/can't recall (9) *(skip to 2.37)*

2.36. When there has been a water shortage problem, how long is the borehole usually not functioning before the flow is restored? *Write in either the number of days or weeks or months OR check part d.*
a. _____days
b. _____weeks
c. _____months
d. _____when rainy season begins (1 if checked, 0 otherwise)

2.37. Has the borehole ever had technical problems in the past, such as breakdowns of the handpumps?
___Yes (1)
___No (0) *(skip to question 2.39)*

2.38. When there has been a technical problem, how long is the borehole usually not functioning before the flow is restored? *Write in either the number of days or weeks or months OR check part d.*
a. _____days
b. _____weeks
c. _____months
d. _____never had technical problem (1 if checked, 0 otherwise)

2.39. Who owns the boreholes in the village? ***(do not prompt)***

_____The community (1)
_____The attendant (2)
_____The caretaker (3)
_____Village leaders (4)
_____The unit committee (5)
_____Watsan committee (6)
_____The district government (7)
_____The regional government (8)
_____WSMT (9)
_____RCC (10)
_____CWSA (11)

_____Donor (e.g. World Bank) (12)
_____NGO (13)
_____Other (14) (specify:_____)
_____Don't Know (99)

2.40. Who repairs and maintains the system? ***Check the person or organization that the respondent thinks takes the lead role in repairing and maintaining the borehole.***
_____The community (1)
_____The attendant (2)
_____The caretaker (3)
_____Village leaders (4)
_____The unit committee (5)
_____Watsan committee (6)
_____The district government (7)
_____The regional government (8)
_____WSMT (9)
_____RCC (10)
_____CWSA (11)
_____Donor (e.g. World Bank) (12)
_____NGO (13)
_____Other (14) (specify:_____)
_____Don't Know (99)

2.41. Who do you think <u>should</u> repair and maintain the system? This may not be the person or organization currently responsible for repairs and maintenance. ***Check only one person or organization that the respondent thinks should take the lead role in repairing and maintaining the borehole.***
_____The community (1)
_____The attendant (2)
_____The caretaker (3)
_____Village leaders (4)
_____The unit committee (5)
_____Watsan committee (6)
_____The district government (7)
_____The regional government (8)
_____WSMT (9)

_____RCC (10)
_____CWSA (11)
_____Donor (e.g. World Bank) (12)
_____NGO (13)
_____Other (14) (specify:_____)
_____Don't Know (99)

2.42. How satisfied are you with the preventative maintenance and repair service for the boreholes?
_____Satisfied (3)
_____Neutral (2)
_____Dissatisfied (1)

2.43 a. Do you believe the boreholes installed in the SRWSP will continue to function over the next year?
_____no (0) _____yes (1) b. If no, why not?
_____

2.44 a. Do you believe the boreholes installed in the SRWSP project will continue to function over the next 5 years?
_____no (0) _____yes (1)_____Don't Know/No Opinion (9)
b. If no, why not?_____

E. Extent of institutional arrangements and linkages that support Rural Water Management (RWM)

2.5 Do you interact with CWSA? 1. Yes 2. No
2.6 If yes, when was the most recent visit? 1. Today 2. Within this week 3. Last Month 4. Last Year 5. Others (Specify) ……..
2.7 Apart from the visits, what other relationship exist between you and any other organization/institution in relation to the RWS? 1. Official 2. Unofficial

SECTION 3: History of and Attitudes about Water project

We have talked about the water you were using before the boreholes were installed. Now I want to understand what happened when the SRWSP were installed. I'm going to ask you a series of questions about your awareness of the new project and whether you were involved in helping to plan the new project. I need you to think back to the time before you were using water from this project. If you don't remember what happened, that's fine – just tell me you don't remember.

3.1 Was your household aware that a water system would be placed in your village **before** construction began?
(0) No_____***(skip to 3.17)***
(1) Yes _____
(9) Don't remember_____(***skip to 3.17)***

3.2 In some projects like these, there are community meetings about the project before it's built to discuss the project and sometimes to make decisions about the project. How many meetings about

the water supply project (formal or informal) did you or someone in your household attend **before** construction?

_____none (0) ***(Skip to 3.4)***
_____only 1 (1)
_____2-4 (2)
_____5-10 (3)
_____more than 10 (4)
_____some but can't remember how many (8)
_____don't know if we attended / don't remember ***(skip to 3.4)*** (9)

3.3 Who attended these meetings from your household? ***Check all that apply.***

a) _____Respondent (1 if yes, 0 otherwise)
b) _____Respondent's spouse (1 if yes, 0 otherwise)
c) _____Other male (specify_____) (1 if yes, 0 otherwise)
d) _____Other female (specify_____) (1 if yes, 0 otherwise)
e) _____Don't remember (1 if yes, 0 otherwise)

I'm going to read you a list of decisions that might have been made about the water project. Please tell me whether you or someone in your household personally participated in making these decisions; either at a meeting or in some other way such as through a conversation with a watsan committee member. Even if you did not agree with the final decision, please let me know if you gave input or participated in the decision.

Before the project, did you participate in	Did not participate or give input (0) Participated or gave input (1) Don't remember (9)
3.4. Choosing the type of technology (for example well or borehole, mechanical or handpump, type of handpump)?	
3.5. Identifying possible sites for the boreholes?	
3.6. Choosing where to drill the boreholes?	
3.7 Deciding on or electing the watsan committee?	
3.8. Determining the hours and days that the water system would operate?	
3.9. Deciding how much each household would have to contribute for construction of the system; such as labor or cash contributions?	
3.10. Setting the tariff for water provided by the system?	
3.11. Selecting the first attendant?	
3.12. Selecting the first caretaker?	
3.13a. Were there any other kinds of decisions in which you participated?	
3.13b. What were the decisions? *Place answer in space below if yes*	

3.14. Do you agree with the decisions that were made in the planning of this system, or are there decisions that you would change if the system was planned again?

_____Agree with all decisions (1)
_____Do not agree with all decisions, would change (***specify***:
_____) (0)
_____Don't Know/Don't Remember (9)

3.15. Who do you think had the most influence over the decisions made before the project was constructed? (***Don't probe)***
_____the community (1)
_____watsan committee (2)
_____WSMT (3)
_____other external government agents (e.g. District Assembly, CWSA, etc.) (4)
_____private drilling contractor (5)
_____PO / NGO (6)
_____Donor (7)
_____Village leaders (8)
_____Unit Committee (9)
_____Assemblyman (10)
_____other (***specify***_____) (11)
_____Don't Know/Don't Remember (99)

3.16 a. Did you attend any trainings or educational sessions about the new water system before the boreholes were constructed?
(0) No_____(*Skip to 3.17)*
(1) Yes _____
(9) Don't remember_____(*Skip to 3.17)*
What kind of trainings? *Check all that apply.*
b) _____hygiene trainings or education (1 if checked, 0 otherwise)
c)_____ maintenance trainings or education (1 if checked, 0 otherwise)
d) _____conflict resolution (1 if checked, 0 otherwise)
e) _____training but don't remember the topic (1 if checked, 0 otherwise)
f) _____Other: (specify_____) (1 if checked, 0 otherwise)

3.17a. Did your household contribute anything toward the construction of the boreholes and handpumps?
(0) No_____*(skip to 3.18)*
(1) Yes _____
(9) Don't remember/ Don't Know_____*(skip to 3.18)*

Did you contribute (*read and **fill in all that apply)***
b. Labor (Number of days per household =_____) or Don't Know (99) _____
c. Materials (Approximate Value of Materials in cedis =_____) or Don't Know (99) _____
d. Funds (Amount in cedis:_____) NOTE***: if household paid for private connection, do not include connection fee here*** or Don't Know (99) _____

e. Land (Approximate Value =_____) or Don't Know (99)

f. Other, specify _____

3.18 Overall, how would you rate the construction quality of the new system? Would you say it was…?
_____Excellent (4)
_____Good (3)
_____Fair (2)
_____Poor (1)
_____Don't Know (99)

Now I would like to ask you a few questions about the management, operations, and maintenance of the new water system today.

3.19 Do you know what happens and what is discussed at watsan or community meetings about the management of the boreholes?
_____No (0) *(skip to 3.24)*
_____Yes, sometimes (1)
_____Yes, most of the time (2)

3.20. How are you primarily informed about these meetings (such as when and where they occur)?
_____From community meeting (1)
_____Reports from watsan members (2)
_____Informal discussion within community (3)
_____Public announcements (4)
_____Other (9) (please specify:_____)

3.21. How are you primarily informed about what happens at these meetings (e.g. decisions taken, topics, etc)?
_____Someone in the household attends the meetings (1)
_____From community meeting (2)
_____Reports from watsan members (3)
_____Informal discussion within community (4)
_____Public announcements (5)
_____Other (9) (please specify:_____)

3.22 How many meetings about the management of the boreholes and handpumps have you or someone from your household attended in the last year?
_____none ***(skip to 3.24)*** (0)
_____only 1 (1)
_____2-4 (2)
_____5-10 (3)
_____more than 10 (4)
_____some, but can't recall how many (8)
_____don't know / don't remember ***(skip to 3.24)*** (9)

3.23 Who attends these meetings from your household? ***Check all that apply*.**

a. _____Respondent (1 if checked, 0 otherwise)
b. _____Respondent's spouse (1 if checked, 0 otherwise)
c. _____Other male ***(specify***_____) (1 if checked, 0 otherwise)
d. _____Another female (***specify***_____) (1 if checked, 0 otherwise)
e. _____Don't remember (1 if checked, 0 otherwise)

3.24 a. Have you or someone in your household attended any trainings or educational sessions about the new water system **since construction was completed** until the present?

_____no ***(SKIP to 3.26)*** (0)
_____yes (1)
_____don't remember ***(SKIP to 3.26)*** (9)

If yes, which trainings did you attend? ***Check all that apply.***
b) _____hygiene trainings (1 if checked, 0 otherwise)
c) _____maintenance trainings (1 if checked, 0 otherwise)
d) _____trainings on conflict resolution(1 if checked, 0 otherwise)
e) _____financial trainings (1 if checked, 0 otherwise)
f) _____training but don't remember the topic (1 if checked, 0 otherwise)
g) _____other (specify_____)(1 if checked, 0 otherwise)

3.25. How would you rate the quality of these trainings since construction was completed until the present?
_____Excellent (4)
_____Good (3)
_____Fair (2)
_____Poor (1)

3.26 Overall, how satisfied are you with the management and activities of the watsan committee? Are you…?
_____Satisfied (3)
_____Indifferent (2)
_____Not satisfied (1)

3.27. Who do you think should be in charge of managing water services in the village? (***don't prompt***)
_____Community (0)
_____Watsan committee (1)
_____Village leaders/chief (2)
_____District Assembly (3)
_____National ministry (4)
_____Private operator (5)
_____Non-governmental organization (6)
_____Donor (7)
_____DWST (8)
_____other (specify_____) (9)
_____don't know (99)

3.28 How trustworthy do you believe the members of the watsan committee are? Would you say they are..

_____Trustworthy (3)
_____Somewhat Trustworthy (2)
_____Not Trustworthy (1)
_____Not sure (9)

3.29 Do you know how the money collected to run the water supply project is spent?
_____no (0)
_____yes (1)
_____money is not collected (2)

3.30. Do you believe the watsan committee should try to expand or improve the current water system?
_____No (0) ***(skip to 3.32)***
_____Yes (1)

3.31. What two improvements to the water system would you like the watsan committee to undertake? ***Place a '1' next to the most important and a '2' next to the second most important priority. Do not prompt..***
a) _____Water Availability (1 if most important, 2 if second most important, 0 otherwise)
b) _____Water Quality (1 if most important, 2 if second most important, 0 otherwise)
c) _____New boreholes (1 if most important, 2 if second most important, 0 otherwise)
d) _____Add private connections/upgrade service (1 if most important, 2 if second most important, 0 otherwise)
e) _____Change operation or management of boreholes (1 if most important, 2 if second most important, 0 otherwise)
f) _____Change tariff or method / frequency / amount of payment (1 if most important, 2 if second most important, 0 otherwise)
g) _____More preventative maintenance (1 if most important, 2 if second most important, 0 otherwise)
h) _____Improve repair service (1 if most important, 2 if second most important, 0 otherwise)
i) _____ Other (***specify***:_____) (1 if most important, 2 if second most important, 0 otherwise)

3.32a Has your **household** been visited by staff from any external organization (government, NGO, donor, etc) regarding the project since the project was completed?
_____no (***SKIP to Section 4***) (0)
_____yes (1)

3.32b. If yes, do you remember what organization they came from? ***Check all that apply.***
_____1. WSMT (1 if checked, 0 otherwise)
_____2. EHA (1 if checked, 0 otherwise)
_____3. PO (1 if checked, 0 otherwise)
_____4. Other NGO (1 if checked, 0 otherwise)
_____5. Donor (1 if checked, 0 otherwise)
_____6. Other (1 if checked, 0 otherwise)

UNIVERSITY OF GHANA

Collage of Humanities

INSTITUTIONAL ARRANGEMENTS, ACTORS AND OUTCOMES IN COMMUNITY-BASED MANAGEMENT MODEL OF DRINKING WATER SUPPLY IN RURAL GHANA: A CASE STUDY OF NADOWLI-KALEO DISTRICT

Appendix IV

Guide to Focus Group Discussion with Women

Interviewee: _____ District Name: _____

Address: _____ Village Name: _____

Time Start: _____ GPS Coordinates----------

Date of Focused Group---------- No. of Participants ----------

Introduction

Thank you for meeting with me today. My name is STEPHEN YIR-ERU ENGMEN, a PhD student from the University of Ghana and I'll be leading this meeting. This is MARIA JOHANA YUORPOR; she'll be taking notes.

The purpose of this meeting is to learn about the SRWSP water supply. In most communities, women are the primary users of water and are the most affected by improved water sources. My research is entitled:

"Actors, Institutions and Outcomes of Community-Based Management of Drinking Water Supply in Rural Ghana: A Case Study of Nadowli-Kaleo District."

So, we wanted to talk to you to see if this is the case in your community and to understand your role in community water supply in your community. We are holding similar meetings, as well as conducting surveys, in other communities in the district. The purpose of these exercises is to understand how water systems in communities like yours are functioning, and what supports might be needed to help them function better.

Everything you tell us today will be kept confidential. The research team will not report any of your names to the community water committee or to any government representatives, so we hope you will feel comfortable sharing your opinions with us.

As you know, we are interested in the SRWP project (boreholes) which installed boreholes in 2015?

NOTE: *Record the dialogue that ensues. Make sure the group reaches consensus on what the project is and which boreholes we are talking about before continuing. Make a note of any institutions involved in the water project, e.g., donor and/or government agencies.*]

1. Satisfaction with current water supply situation

1.0. a. How many of you have ever obtained water from this borehole? _____persons

1.1 a. Overall, what would you say about the water pressure from this borehole?
_____

1.2 a. Overall, how is the taste of water provided by this borehole? _____
_____1)

1.3 a. Overall, how is the color of water provided by this borehole?_____
____

1.4 a. Overall, how is the odor of water produced by this borehole?_____

1.5 a. Overall, how safe do you think that the water provided by the project is for drinking without treatment? _____

1.6a. What would you say about the operation of this borehole?_____
____

1.6 b. What do you dislike most about the operation of the borehole?_____

Now I would like you to think about the service from this borehole four years ago and compare it to today.

1.7 a. What would you say about the reliability of service from this borehole.

1.8. What would you say about the water quality from this borehole over the past 5 years (*Research Assistant, please probe in terms of improvement, deterioration, or stayed the same in the last three years*)?_____

1.9. What would you notice about the operation of the borehole over the past 5 years? (*Research Assistant, please probe in terms of improvement, deterioration, or stayed the same in the last three years*)?_____

Benefits of the system and choice of source

1.20a. Thinking about the borehole**,** how have you personally benefited from the installation of this borehole? ***(e.g. Time savings, income savings, better health, productive uses in household, uses away from household, etc. If time savings, ask what they do with their time)***

_____

_____

1.20 b. *Check issues that were mentioned in discussion:*
_____1. time savings (1 if checked, 0 otherwise)
_____2. save physical energy in collecting water (1 if checked, 0 otherwise)
_____3. better health/ fewer water borne diseases (1 if checked, 0 otherwise)
_____4. monetary savings (1 if checked, 0 otherwise)
_____5. social benefits (1 if checked, 0 otherwise)
_____6. business/productive uses of water (1 if checked, 0 otherwise)

1.21 When you choose what water source to use for drinking and cooking for your household, what two factors weigh most heavily in your decision?

	1. Number of women saying it was most important factor	2. Number of women saying it was second most important factor
a. Price		
b. Payment system		
c. Reliability		
d. Proximity to house / travel time and distance		
e. Waiting/collecting time		
f. Taste		
g. Perception of safety		
h. Social opportunities		
i. Relationship with attendant		
j. Other		

2. Payment

2.1 a Given the service you receive from these boreholes and the benefits you have mentioned; what do you think about the price that you pay for this service _____

_____

2.2 a Do you think that the users of a borehole should pay the full cost of maintaining and operating a borehole and handpump, including money to cover any repairs that are needed? Why?_____

_____

2.3 a. Who do you think should be responsible for paying for the costs that are not covered by the borehole users?_____ b.

2.4a. Which payment system would you most like to see at the borehole you use?_____

____

2.5 Why would you like to see this method of payment (in 2.4a)?

_____

_____

2.6a. Do you think the fees collected should be high enough to create a reserve fund for when repairs are needed? Or should the fee just cover ongoing expenses, with extra funds being collected when repairs and needed? _____

2.7. Why?_____

2.8. Are you willing to pay extra money *(see below)* in your water bill so that any of the following people could be paid for the work they do in running the water system?

a1. WATSAN committee member

_____Yes (1)

_____No (0)

a2. How much would you be willing to pay? _____cedis

a3. Facilitator: are responses generally uniform?____(1) or some dissent?_____(0)

b1. Caretaker

_____Yes (1)

_____No (0)

b2. How much would you be willing to pay? _____cedis

b3. Facilitator: are responses generally uniform?_____(1) or some dissent?_____(0)

2.9a. Would you be willing to pay an extra amount of 200 cedis per month to have the WSMT or an EHA visit the community four times a year to provide technical assistance to the caretaker, to check on the condition of the system, and to help resolve any problems with the management of the system? This fee would not cover any repairs that might need to be done.

b. *Facilitator: Are participants' responses...*

_____Yes (1) _____Generally uniform? (1)

_____No (0) _____Some dissent? (0)

c. If yes, how much would you be willing to pay? _____cedis

Record major points made in discussion on pages attached to survey.

3. Attitudes about WATSAN Committee, Attendants, and Caretakers

Now I would like to ask you a few questions about the management of the boreholes.

3.1 Who is in charge of managing the system (i.e. making decisions)? ***(initially do not prompt***)
_____The community (1)
_____The attendant (2)
_____The caretaker (3)
_____Community leaders (4)
_____The unit committee (5)
_____WATSAN committee (6)
_____The District Assembly (7)
_____RCC (8)
_____WSMT (9)
_____RWST (10)
_____CWSA (11)
_____Donor (e.g. SRWSP or World Bank) (12)
_____NGO (13)
_____Other (14) (specify:_____)
_____Don't Know (99)

3.2 Who **should** be in charge of managing the system? (***initially do not prompt***)
_____The community (1)
_____The attendant (2)
_____The caretaker (3)
_____Community leaders (4)
_____The unit committee (5)
_____WATSAN committee (6)
_____The District Assembly (7)
_____RCC (8)
_____WSMT (9)
_____RWST (10)
_____CWSA (11)
_____Donor (e.g. SRWSP or World Bank) (12)
_____NGO (13)
_____Other (14) (specify:_____)
_____Don't Know (99)

3.4 How trustworthy is the committee ?_____

3.5 How is the money collected to run the water supply project spent?_____

3.6
Are there areas that WATSAN committee should improve? If yes, what are the two improvements that you would like to see the WATSAN committee undertake?_____

3.8 Is your WATSAN committee capable of handling other needs besides water?_____
3.9 What two needs should the current management committee much concern about? _____

3.10a. How satisfied are you with the attendants at the boreholes?_____

3.11. How satisfied are you with the preventative maintenance at the boreholes?
_____

3.12a. How satisfied are you with the quality of repair services at the boreholes?
_____

4. Project Planning/Implementation

I'd like to ask you to think back to the time when the project was being designed and introduced to the community.

4.1 In some communities we've visited, residents told us that improving water supply was not as important as some other priorities that the community had at the time, while others have said that water supply was one of the most important issues for their community. What do you say about this?

4.2. **Before** construction began, were you aware that a water system would be placed in your community? If yes, how did you first hear about the new water system? *Probe as to when women became aware and how they were informed.*

_____

_____

_____

4.4. Were community meetings held in respect to the water project? If yes, about how many people attended the meetings?_____

4.5. Among these participants, about how many on average were women? *If no one in the group knows, skip to 4.6.*

a) Before construction began?_____women
b) Since construction ended?_____women

4.6 How did women in this community get involve in the project meetings?
_____

4.7 To the best of your knowledge, did the women who attended these meetings before and during construction participate as actively as the men did in discussions and decision- making, or did they participate more or less than the men?_____

4.8a. How many of you did not participate in any meetings related to the water project?
_____(number)

4.8b. Why did you not participate? _____

Now I'd like to ask you about the ways the community was involved during the water supply project. I'm going to read a list of

4.18a. Were there any trainings (e.g. hygiene education, maintenance and repair, payment and financial operations of the system) that were available for women to participate in before or during the project?_____

4.18b. Did you participate in any of these trainings before or during construction of the project?

1) Before the project: ___yes (1) ___no (0) ___don't remember (9)
2) During the project: ___yes (1) ___no (0) ___don't remember (9)

If women did not participate in either one of the two training periods, ask the following:

4.19. If not, why not?_____
4.20. How did women in this community were participated in trainings before and during construction?
_____

4.21a. Have there been any trainings (e.g. hygiene education, maintenance and repair, payment and financial operations of the system) that were available for women to participate in after the completion of the project?

___Yes (1)
___No (0) *(skip to Section 5)*
___Don't Know (9) *(skip to Section 5)*

4.21b. Have any of you attended any trainings in the post construction period? _____
___No (0)
___Yes (1) ***(if yes, skip to 4.21d)***

4.21c1. If no, why not? *(then skip to 4.22)*
___Meetings were scheduled inconveniently (1)
___Men discouraged us from participating (2)
___I did not think the project was important (3)
___I had to stay at home and do domestic work (4)
___Don't seem relevant to me (5)
___Not invited to participate (6)

c2. *Facilitator: Were responses.*
_____Generally uniform? (3)
_____Some Dissent? (2)
_____Strong dissent? (1)

____Not aware of any trainings (7)
____Not interested (8)
____Other (9)

4.21d. If yes, what kinds of training? *Mark all that apply*
1) _____hygiene trainings or education (1 if checked, 0 otherwise)
2)_____maintenance trainings or education (1 if checked, 0 otherwise)
3) _____conflict resolution (1 if checked, 0 otherwise)
4) _____training but don't remember the topic (1 if checked, 0 otherwise)
5) _____Other: (specify_____) (1 if checked, 0 otherwise)

4.22. How did women in this community participated in post construction trainings?
_____

4.23 ***To what extent were you*** satisfied with the quality of the training?_____

4.24. *(ask women who were trained)* What improvements to the training would you have liked to see?

_____

_____

5. Water resource situation

Finally, I'd like to ask you some questions about the water resource situation in your community

5.1 How long does the dry season in this community typically last?
_____Months

5.2 Do the streams and rivers closest to your community have water all year round, do they sometimes dry up in the dry season, or do they always dry up in the dry season?_____

5.3. Do you have any community hand-dug wells?
_____Yes (1)
_____No (0) *(if no, skip to 5.5)*

5.4. How often do they dry up during the year?_____

5.5 a. Have there been any floods that you remember in this community?
____no (0) *(skip to 5.6)*
____yes (1)
5.5b. When? 1)_____, 2)_____, 3)_____(year(s))

5.6 a. Have there been any droughts that you remember in this community?

___no (0) *(skip to end)*
__yes (1)
5.6 b. When? 1)_____, 2)_____, 3)_____(year(s) (*If last drought before completion of the new system, skip to finish)*

5.7 (***If last drought occurred after completion of the new system)*** How did this affect the water supply provision in the community? _____

This is the end of the survey. Thank you for your time and thoughtful answers. Do you have any final comments? *Record below.*

_____

Time Completed: _____