COMMUNITY PARTICIPATION AND OPERATION AND MAINTAINANCE OF PIPED WATER SUPPLY SYSTEMS AMONG HOUSEHOLDS IN SMALL TOWNS IN EASTERN UGANDA

BY

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DECLARATION

I hereby declare that this dissertation is the result of my independent investigation and all the sources used have been acknowledged by means of complete references.

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APPROVAL

This dissertation has been presented for examination in partial fulfillment of the requirements for the award of the Degree of Masters in Management Studies (Project Planning and Management) with our endorsement as supervisors:

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DEDICATION

This dissertation is dedicated to my dear wife, Brenda Agumisa Sunday and my dear parents Mr. & Mrs. Mwongyera Aloysius.

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APWO	Association of Private Water Operators
BOU	Bank of Uganda
CBMS	Community Based Management Systems
GPOBA	Global Partnership on Output Based Aid
GOU	Government of Uganda
IFC	Internal Finance Corporation
MFPED	Ministry of Finance, Planning and Economic Development
MWE	Ministry of Water and Environment
NWSC	National Water and Sewerage Corporation
O&M	Operation and Maintenance
RWSRIP	Rural Water Sector Reform and Investment Plan
WHO	World Health Organization

ABSTRACT

This study sought to examine the relationship between community participation and operation and maintenance (O&M) of piped water supply systems in small towns in Eastern Uganda. Its objectives included: (i) finding out the relationship between level of community participation in planning and O&M of the water systems, (ii) establishing the relationship between level of community participation in implementation and O&M of the water systems, and (iii) determining the relationship between level of community participation in monitoring and O&M of the water systems. Using a cross-sectional survey design, data was collected through questionnaires, interviews and observation. Results showed a significant positive relationship between level of community participation in planning and O&M (r = 0.667, p = 0.035), a significant positive relationship between level of community participation in implementation and O&M (r = 0.592, p = 0.018), and a significant positive relationship between level of community participation in monitoring and O&M (r = 0.481, p = 0.022). The conclusion is that increasing the level of community participation in planning, implementation, and monitoring of piped water supply systems, would improve the O&M of the water systems in the study areas. Thus, the study recommends listening to members' views, respecting their preferences and equipping them with necessary information for making informed decisions related to the water systems; establishing proper accountability mechanisms, economically empowering community members and compensating members for sacrificing resources towards implementing water projects; and designating specific agreeable times/days for inspecting water systems and effectively addressing water system mul-functionality issues raised by community members respectively.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

In spite of the existence of a community participation legal and institutional framework aimed at ensuring community involvement in the management of community-based water resources including ensuring the operation and maintenance (O&M) of community-based water resources, the O&M of piped water supply systems in small towns in Eastern Uganda is poor, with numerous water facilities reported either not functioning, broken down or abandoned. This study investigated the relationship between level of community participation and the O&M of piped water supply systems in small towns in Eastern Uganda. This chapter presents information concerning this topic in the following sections: background to the study, problem statement, purpose, objectives, research questions, hypotheses, conceptual framework, significance, justification, scope and operational definitions.

1.1 Background to the Study

1.1.1 Historical background

The role of community participation in the management of community-based water resources started in the late 1970s (McGhee, 2003). Prior to the late 1970s, water resource management and development approaches were highly centralized under government and state agencies. However, these approaches faced severe public criticisms for their failure to distribute benefits fairly (Mwakila, 2008). As a result, they collapsed and were replaced with a paradigm shift that put more emphasis on participatory community-based management of water resources. Since then, participatory community-

based management of water resources has become a popular way that governments, international donors, and Non-Government Organizations (NGOs) use to pursue water-related development goals (Agarwal, 2000; Cornwall, 2003). The rationale of such approaches was to allow direct participation of beneficiaries in management of their water resources so as to instill a sense of resource ownership, eventually leading to sustainable use of the water resources (Mwakila, 2008; Bardhan, 2001).

In many African countries, community participation is viewed by both governments and development partners as an invaluable ingredient in ensuring effective and sustainable management of water projects. In South Africa, for instance, the Tonga water resources management project had a strong community health education component that resulted in ensuring proper sanitation around community-based water sources (Yilma & Donkor, 1997). In Kalomo (Zambia), the local community was mobilized to protected a water catchment area by building a fence around borehole and ensuring regular cleaning of the water point (Kauzeni & Madulu, 2001; Bell, 2001). The cited examples demonstrate the importance of community participation in effective management of community-based water projects.

In the case of Uganda, community participation in community-based water and sanitation initiatives has existed since the early 1990s (UNICEF, 1996). This followed previous government-controlled/directed water resource management systems that failed to yield desirable results. Because beneficiaries of government-controlled water programs and projects were initially excluded from all the management processes such as planning,

implementation and monitoring, numerous government-controlled water facilities ceased functioning due to misuse, theft, vandalism and lack of care (UNICEF, 1996). It is against this background that the Uganda Government realized the importance of involving beneficiaries or communities in managing community-based water systems and adopted the community participation approach. Today, including a component of community participation is a must-condition for accessing government funds needed in setting up community-based water projects to address community-based water needs and problems.

The proponents of community participation argue that the approach helps the communities to assess their own problems, prioritize the problems, and suggest possible interventions to solve these problems (Cornwall, 2003; Argawal & Gibson, 2001). According to Mansuri and Rao (2003), community participation leads to the development of projects that are more responsive to the needs of beneficiaries, better delivery of public services, better maintained community-based resources, and a more informed and involved citizenry. Bell (2001) argues that community participation in management of community-based resources demonstrates the importance of local communities' consent in public decision-making processes, especially on issues that directly affect their welfare. He further argues that community participation builds public trust. The lack of it might lead to protests and antagonism between resource users and stakeholders due to varying interests. Thus, community participation was presumed to be an important factor in management of resources including water resources and water resource issues such as operation and maintenance of water supply systems.

1.1.2 Theoretical background

The study was based on the resource mobilization theory. The resource mobilization (RM) theory was developed in the 1970's by McCarthy and Zald (1973). The theory postulates that active and collective involvement in community activities enables communities to achieve their goals. According to Schouten and Moriarty (2003) and Kasiaka (2004), community members should be actively involved in all the stages of planning, implementation, and monitoring community activities if they are to achieve their goals; otherwise, they will not achieve them. This notion is based on McCarthy and Zald's (1973) assertion that actively involving community members in activities or projects that directly and indirectly affect their welfare is a pre-condition for successful community-based activities because it generates feelings of trust, attachment to, ownership of, and care for community activities by the members.

There exists a positive linkage between community participation and effective management of community resources (Bardhan, 2001; Harvey & Reed, 2007). The higher the level of community members' involvement in the various community-based resource management issues, the higher the effective management of the community resources. This is premised on the notion that allowing direct participation of community members in management of their resources generates feelings of trust, attachment to, ownership of, and care for community activities by the members, eventually leading to sustainability of the community resources (McCarthy & Zald, 1973). A similar view is expressed by Mwakila (2008), who contends that community participation is considered a prerequisite

successful implementation and sustainability of community-based projects through promoting community resource ownership.

This theory was considered applicable to this study because of the assumption that successful operation and maintenance of piped water supply systems in small towns in Eastern Uganda is a community-based goal, which can only be attained if the community members are actively involved in all processes and stages aimed at achieving O&M of the water systems including planning for the water systems, implementing the water system ideas, and monitoring progress of implementation and achievement of the water system ideas. However, while adopting this theory, the researcher was not ignorant of its short comings. For instance, the interrelationships among the various stages of community participation have to be recognized and understood by all people involved.

1.1.3 Conceptual background

According to Schouten & Moriarty (2003), community participation is an active process through which beneficiaries are involved in influencing the direction and execution of development projects rather than merely receive a share of a project's benefits through activities such as planning, implementation and monitoring. Community participation is thus, a multi-dimensional concept, characterized by dimensions such as community participation in planning, community participation in implementation, and community participation in monitoring.

Community participation in planning is the extent to which community members are involved in discussing ideas and determining decisions related to community-based water

systems. This includes: inviting community members to attend meetings related to the water systems, allowing members to freely contribute ideas, listening to members' ideas and considering members' ideas in the final decisions related to the water systems (Kasiaka, 2004).

Community participation in implementation is the extent to which community members are involved in activities aimed at executing desired goals related community-based water systems. The activities may include: contributing money for managing the water facility, contributing necessary materials for constructing the water facility, contributing necessary labor for constructing and general management of the water facility, and sparing time to attend to any necessary issues related to the water project (Schouten & Moriarty, 2003).

Community participation in monitoring is the extent to which community members are involved in activities aimed at checking the progress towards achieving desired goals related community-based water systems. Such activities may include: regular inspection of the water site and water facility, ensuring security of the water facility, and reporting to the concerned authorities the functionality status of the water facility (Harvey & Reed, 2007).

Operation and maintenance is used to refer to the extent to which a water supply system functions normally and is kept in a good working condition to sustain its functionality (Castro, 2009; Dockel, 1995). According to Castro (2009), a water supply system is said

to function normally or optimally when it generates enough water, it generates quality, and generates enough quality water whenever needed. Dockel (1995) notes that keeping a water supply system in good working condition to sustain its functionality involves regular cleaning of water system catchment areas, regular greasing of the water system mechanical parts and immediate replacement of its broken parts. Thus, in this study's context, the characteristics of operation and maintenance include optimal functionality of the water system (provision of adequate water, provision of quality of water, and provision of water whenever needed) and good working condition of the water system to sustain its functionality (regular cleaning of water system catchment area, regular greasing of the water system mechanical parts, and immediate replacement of the water system broken parts).

1.1.3 Contextual background

Community participation is an important factor in ensuring effective and sustainable management of community-based water resources including operation and maintenance of water supply systems. The Government of Uganda through the Water Statute (1995), National Water Policy (1999), Rural Water Sector Reform and Investment Plan (SIP 2000-2015) and Community Based Management System (CBMS) considers community participation as an important ingredient in management of community-based water resources and outlines the roles of the community members in management of the water resources including the operation and maintenance of water supply systems.

The water sector is one of Uganda's priority areas for poverty eradication (Ministry of Finance, Planning and Economic Development [MFPED], 2008). It is the government's

desire to increase access to safe water by the population to 100% by the year 2015. Accordingly, government has put in place a number of measures aimed at achieving this objective. A National Water Policy was launched in 1999 specifying the guiding principles in the delivery of water services. In 22 cities and large towns water supply and sewerage--where it exists--is provided by the National Water and Sewerage Corporation (NWSC), a public utility working on a commercial basis. By 2009 it provided services to 3.8 million people in Kampala, Jinja/Lugazi, Entebbe, Tororo, Mbale, Lira, Gulu, Masaka, Mbarara, Kabale, Kasese and Fort Portal, Bushenyi/Ishaka, Soroti, Arua, Masindi, Malaba, Iganga, Hoima, and Mubende (NWSC, 2010).

In small towns--towns in Uganda in terms of water service delivery that are characterized by a population between 5,000 and 30,000 people--water facilities are owned and managed by local communities, local governments, and supported by the MWE (MWE, 2010). Eastern Uganda has 6 towns designated as small towns by the MWE including Kamuli, Nawanyago, Palisa, Tirinyi, Nankoma and Busembatia. In these towns, the concerned local governments have created Water Authorities, which contract out piped water services under 3-year contracts to local private operators using support from the Government and the donor community through the International Finance Corporation (IFC) and the Global Partnership on Output-Based Aid (GPOBA). For ensuring sustainability, private operators and local community leaders are required by law to involve community in the various piped water supply management activities such as planning, implementation, and monitoring of the water projects.

As a result of the various private operator and government initiatives, water quantity and user satisfaction in small towns in Eastern Uganda have improved. As of the year 2008, about 9500 yard taps had been completed and verified, serving approximately 12,100 people in small towns (MWE, 2011). However, the operation and maintenance of the water supply systems in small towns in Eastern Uganda is being questioned. According to an Operation and Maintenance (O&M) study commissioned by the Directorate of Water Development in 2009, findings indicated that about 37% of all the piped water facilities in small towns in Eastern Uganda were not functioning; they were either broken down or abandoned. These non-functioning facilities depict a waste of resources and heighten the need for understanding the underlying causes of this undesirable situation.

1.2 Statement of the Problem

The Government of Uganda through the Water Statute (1995), National Water Policy (1999), Rural Water Sector Reform and Investment Plan (RWSRIP 2000-2015) and Community Based Management System (CBMS) considers community participation as an important ingredient in sustainable management of community-based water resources and clearly outlines the ways of involving the community members in achieving this outcome. These include involving community members in all activities related to planning, implementation and monitoring of the water supply systems. In spite of the existing community participation framework in place, the O&M of piped water supply systems in small towns in Eastern Uganda is poor, with 37% of the water facilities reported either not functioning, broken down or abandoned (O&M Study by the Directorate of Water Development, 2010). In view of this discrepancy, there was need to examine the relationship between the level of community participation in planning,

implementation and monitoring and the O&M of piped water supply systems among households in small town in Eastern Uganda. If the poor O&M of piped water supply systems in small towns in Eastern Uganda is not addressed, it may lead to shortage of safe water, leading to spread of various water-related illnesses such as malaria, diarrhea and intestinal parasites, which are responsible for 50% morbidity in children and women as noted by the World Health Organization (2010).

1.3 Purpose of the Study

The purpose of this study was to examine the relationship between community participation and the operation and maintenance of piped water supply systems among households in small towns in Eastern Uganda.

1.4 Research Objectives

(i) To examine the relationship between the levels of community participation in planning and the operation and maintenance of piped water systems among households in small towns in Eastern Uganda.

(ii) To establish the relationship between the levels of community participation in implementation and the operation and maintenance of piped water systems among households in small towns in Eastern Uganda.

(iii) To determine the relationship between the levels of community participation in monitoring and the operation and maintenance of piped water systems among households in small towns in Eastern Uganda.

1.5 Research Questions

(i) What is the relationship between the levels of community participation in planning and the operation and maintenance of piped water systems among households in small towns in Eastern Uganda?

(ii) What is the relationship between the levels of community participation in implementation and the operation and maintenance of piped water systems among households in small towns in Eastern Uganda?

(iii) What is the relationship between the levels of community participation in monitoring and the operation and maintenance of piped water systems among households in small towns in Eastern Uganda?

1.6 Research Hypotheses

(i) There is no significant relationship between the levels of community participation in planning and the operation and maintenance of piped water systems.

(ii) There is no significant relationship between the levels of community participation in implementation and the operation and maintenance of piped water systems.

(iii) There is no significant relationship between the levels of community participation in monitoring and the operation and maintenance of piped water systems.

1.7 Conceptual Framework

The following figure shows the conceptual framework adopted in studying the relationship between community participation and the operation and maintenance of piped water supply systems among households in small towns in Eastern Uganda. In this conceptual framework, community participation was conceived as the independent

variable, while operation & maintenance of piped water supply systems was the dependent variable.

Figure 1: Conceptual Framework

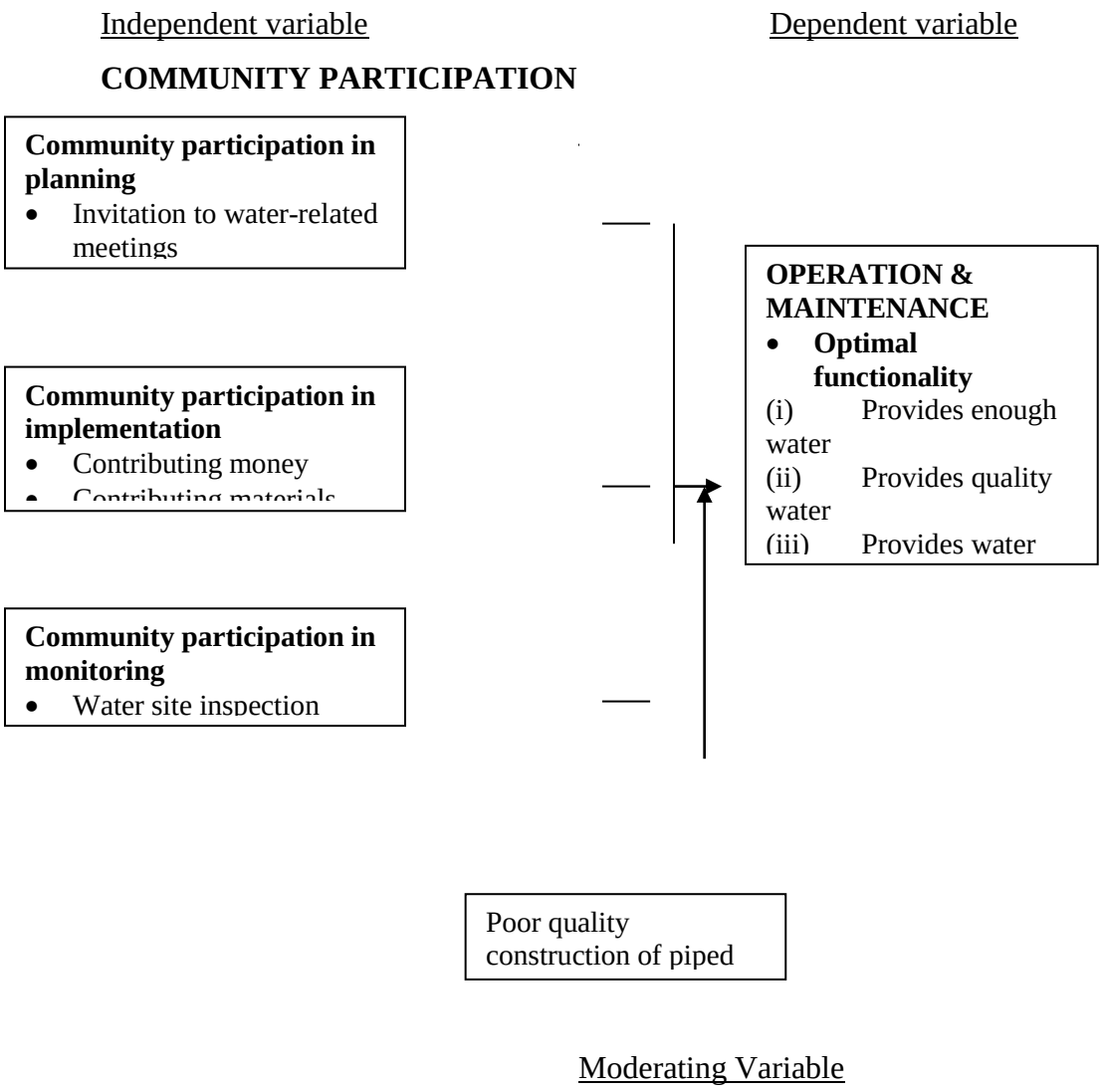

Figure 1: Conceptual framework showing the influence of community participation on operation and maintenance of piped water supply systems
Source: Adopted from Cubillo (2003) with slight modification by the Researcher

From the review of literature, community participation included community participation in planning, community participation in implementation, and community participation in

monitoring, while operation and maintenance included optimal functionality (adequate water quantity and quality) and good working condition of the water systems (regular cleaning of water catchment areas, regular greasing of mechanical parts, and immediate replacement of broken parts). It was thus hypothesized that the higher the levels of community participation in planning, implementation and monitoring, the better the status of functionality and the working condition of the piped water supply systems. On the other hand, the lower the levels of community participation in planning, implementation, and monitoring, the poorer the status of functionality and the working condition of the piped water supply systems among households in small towns in Eastern Uganda.

The relationship between the levels of community participation in planning, implementation, monitoring and O&M of piped water supply systems may be moderated by another factor—construction quality of the piped water supply systems. That is, poor construction quality or the use of low-grade materials may lead to low O&M of the water systems, while good construction quality or the use of high-grade materials may lead to high O&M of the water systems. However, this moderating variable was not of interest to the study; therefore, it was controlled for by excluding it from data collection instruments so as not to interfere with the outcome of study report.

1.8 Significance of the Study

This study is useful to local authorities in the study areas and the water systems private operators because through its recommendations, it suggests how to enhance community participation in planning, implementation and monitoring so as to improve the O&M of

piped water supply systems in small towns in Eastern Uganda. In addition, the study serves as a source of reference to other researchers who are interested in furthering research in community participation and the O&M of piped water supply systems in small towns in other regions of Uganda and elsewhere.

1.9 Justification of the Study

Examining the relationship between community participation and operation and maintenance of piped water supply systems in small towns in Eastern Uganda is very necessary. Poor operation and maintenance of piped water supply systems in the small towns negatively affects supply of clean water, which in turn negatively affects the general health wellbeing of community members. Lack of access to safe water leads to poor hygiene and sanitation practices, which are the major causes of 50% child morbidity (World Health Organization, 2010). Children repeatedly infected with malaria, diarrhoea and intestinal parasites fail to grow normally and become prone to more infections with increasingly serious consequences, the outcome of which is either death or stunted development. The latter outcome contributes to low school performance and low productivity, which fuels the cycle of poverty (WHO, 2010).

Also, a lot of resources are invested in provision of safe water facilities to rural communities. These resources are contributed by Government, Donor Communities plus the Private Sector. All such resources would be considered wasted if, after a short time period, all the water facilities that were constructed break down due to lack of proper community participation in management of such facilities.

Finally, it is often assumed that development is for people and that it is people themselves who must have the ultimate say in the decisions that directly affect their welfare. This approach has been widely adopted in Government water policy documents in form the community participation legal and institutional framework. Therefore, it was necessary to investigate the level of community participation in planning, implementation and monitoring of water supply systems to evaluate the extent to which the community participation policy is being implemented.

1.10 Scope of the Study

1.10.1 Geographical scope

The study took place in small towns in Eastern Uganda including Kamuli in Kamuli District, Nawanyago in Kamuli District, Pallisa in Pallisa District, Tirinyi in Kibuku District, Nankoma in Bugiri District and Busembatia in Iganga District. These towns were chosen because they are the ones that fall under the Uganda Water Small Towns and Rural Growth Centers project—a pilot project in which private operators are eligible for output-based aid (OBA), required for constructing piped water supply systems in small towns in Eastern Uganda.

1.10.2 Content scope

This study focused on the influence of community participation on the operation and maintenance of piped water supply systems in small towns in Eastern Uganda. Community participation was the independent variable characterized by participation in planning, implementation and monitoring of piped water supply systems, while operation & maintenance was the dependent variable characterized by optimal functionality, routine maintenance, and immediate replacement of broken parts.

1.10.3 Time scope

The study considered the period 2005 – 2010. It is during this period that a pilot project--The Uganda Water Small Towns and Rural Growth Centers—was launched for the purpose of increasing piped water supply systems in small towns in Eastern Uganda. It is also within this same period that piped water supply systems in the small towns increased but their operation and maintenance was seriously questioned.

1.11 Operational Definitions

Community participation: The extent to which community beneficiaries and other stakeholders are involved in the management of a project through activities such as planning, implementation and monitoring (Schouten & Moriarty, 2003).

Community participation in planning: the extent to which community members are involved in discussing ideas and determining decisions related to community-based water systems including: inviting community members to attend meetings related to the water systems, allowing members to freely contribute ideas, listening to members' ideas and considering members' ideas in the final decisions related to the water systems (Kasiaka, 2004).

Community participation in implementation: the extent to which community members are involved in activities aimed at executing required in achieving desired goals related community-based water systems including contributing money for managing the water facility, contributing necessary materials for constructing the water facility, contributing necessary labor for constructing and general management of the water facility, sparing time to attend to any necessary issues related to the water project (Schouten & Moriarty, 2003).

Community participation in monitoring: the extent to which community members are involved in activities aimed at checking the progress towards desired goals related community-based water systems including regular inspection of the water site and water facility, ensuring security of the water facility, and reporting to the concerned authorities the functionality status of the water facility (Harvey & Reed, 2007).

Operation & maintenance: the optimal functionality of the water system, including provision of adequate quantity and quality of water; and good working condition of the water system, including regular cleaning of water system catchment area, regular greasing of the water system mechanical parts, and immediate replacement of the water system broken parts (Castro, 2009; Dockel, 1995).

Small towns: towns in Uganda in terms of water service delivery that are characterized by a population between 5,000 and 30,000 people (MWE, 2010)

CHAPTER TWO

LITERATUTRE REVIEW

2.0 Introduction

This chapter presents literature review concerning community participation and operation and maintenance of water supply systems. The chapter presents the information in four major sections. Section 2.1 explains in depth the theory upon which this study was based, while sections 2.2, 2.3 and 2.4 present literature systematically following the objectives of the study, and 2.5 presents the summary of the literature review.

2.1 Theoretical Review

The study was based on the resource mobilization theory. The resource mobilization (RM) theory is a social movement theory developed in the 1970's by McCarthy & Zald (1973). The McCarthy & Zald (1973) approach focuses on how groups (or communities) pursue their goals by effectively mobilizing and using resources at their disposal. The theory postulates that effective mobilization and use of peoples' available resources are vital to the achievement of a group's or community's desired objectives. The theory assumes that society is composed of rational individuals who will provide resources or participate in group or community activities only as long as there are perceived benefits that outweigh the costs of their participation.

In the context of this study, it is assumed that community members have vital physical and non-physical resources which have to be effectively mobilized and used in order to achieve a community's desired goal such as ensuring proper operation and maintenance of water supply systems. The physical resources may include cash and local construction

materials, while the non-physical resources may include time and labor. These resources have to be effectively mobilized and used through fostering community members' participation in activities aimed at achieving a community's desired goal such as ensuring proper operation and maintenance of community-based water supply systems. The mobilization and used of community members' resources is manifested through their participation in project-related activities such as planning, implementation and monitoring. Therefore, the resources (ideas, construction materials, time and labor) are effectively mobilized and used through ensuring community members' participation in activities (planning, implementation, and monitoring) aimed at achieving a community's desired goal (ensuring proper operation and maintenance of water supply systems). The rationality assumption is maintained: community members will participate in management of the water project-related activities such as planning, implementation and monitoring, if they believe that doing so guarantees the operation and maintenance of the water systems.

According to Bardhan (2001) and Harvey & Reed (2007), there exists a positive linkage between community participation and effective management of community resources. The higher the level of community members' involvement in the various community-based resource management issues, the higher the effective management of the community resources. This is because allowing direct participation of community members in management of their resources instills a sense of community ownership, eventually leading to effective and sustainable use and management of the resources (Mwakila, 2008; Bardhan, 2001; Harvey & Reed, 2007). A similar view is expressed by

Kasiaka (2004), who contends that community participation is considered a prerequisite successful implementation and sustainability of community-based projects through promoting community resource ownership. However, while adopting this theory, the researcher was not ignorant of its short comings. For instance, the interrelationships among the various stages of community participation have to be recognized and understood by all people involved.

2.2 Community Participation in Planning and Operation and Maintenance of Water Supply Systems

Community participation in planning is done by mobilising the communities to participate in planning project activities. Participation in planning aims at achieving the following: creating awareness and empowering the community to identify their problems, prioritize them, suggest interventions to solve them and the means of sustaining such interventions. According to GOU (2001), community participation in planning also aims at enticing adequate community participation of stakeholders in project planning (GOU, 2001).

One way of ensuring community involvement in planning for community-based projects is through inviting them to attend meetings addressing various issues related to the projects. According to Howard-Grabman (2000), meetings provide community members with a platform for discussing issues related to the projects. In the case of community-based water projects, this may involve inviting community members to discuss issues related with new water interventions such as provision of piped water supply systems. Bardhan (2001) contends that meetings provide community members with a platform for

analysing their problems and collectively generating appropriate solutions to the problems.

Harvey & Reed (2007) notes that interventions aimed at addressing community problems are likely to succeed where community members are directly involved in identifying, analysing and generating appropriate solutions to the problem. Less of this, the wrong problem may be identified, followed by a wrong prescription to the problem. Empirical evidence seems to support this assertion. A study by Stajkovic & Luthans (2003) found that involving community members in problem solving processes increased chances of success of interventions aimed at solving communities' education needs. This finding is consistent with another study which attributed the failure of community-based environment interventions in remote areas of Ghana to ineffective inadequate involvement of community members in analysis community environment needs in their areas (Bijleveld et al., 2009). There has also been a study in Uganda's Luwero District showing that soil fertility reclamation interventions were successful partly because of effective pre-involvement of community members in problem analysis related to soil fertility (Sekanyonyi & Anderson, 2001). The review indicated that providing platforms for community members to discuss community issues increases chances for successful interventions aimed at addressing community problems. However, the studies did not address the role of meeting to discuss community water-related problems. This study sought to contribute to knowledge by investigating the effect of inviting community members to meetings, and how it affects O&M of piped water supply systems in small towns in Eastern Uganda.

In addition to providing members with a platform to discuss interventions aimed at solving community needs, it is important that community members' ideas are listened to and considered during the deliberations. Davis (1993) notes that proponents of community-based interventions should ensure that ideas of community members are listened to as much as possible and considered, because doing so creates a feeling ideas of the members are valued by suppliers of the intervention, thereby eliciting responsible actions from the members aimed at protecting the interventions. Owor (2010) conducted a study assess the role of community participation in management of community water resources in Arua District. The results partly attributed failure of community water resources in the district to failure of members to act responsibly by taking care of the resources that benefit them as a community. This could be attributed to failure on the part of intervention suppliers to listen and consider input of community members as espoused by Davis (1993). Since community members are likely to become responsible for community-based interventions if their ideas are listened to, the former implies that involving community members in planning through processes such as listening to and considering their ideas is important in ensuring sustainability of community-based interventions. However, the study reviewed did not directly link listening to and considering community members' ideas to sustainable management of community water resources in Arua District. In addition, the study was conducted in the North West part of Uganda. The current study contributes to knowledge by examining whether community participation in planning in terms of listening to and considering community members ideas is related to the O&M of piped water supply systems in small towns in Eastern Uganda.

Community participation in planning for community-based interventions can also be measured in terms of the extent to which the members decide key issues related to the interventions (McIvor, 2000). In community-based water resources, decisions may pertain to the identification of the appropriate water resource technology and water system sites (Dugan, 1990). The extent to which community members are involved in deciding key issues related to community-based interventions determines the success and/or sustainability of the interventions in a positive way. Widespread failures in community-based water projects particularly in developing countries have been partly attributed to community members' low and/or lack of involvement in decision-making related to the projects, among other factors such as the intervention not being desired by the community, and the high costs involved in maintaining the projects (Carter et al, 1999; Parry-Jones et al, 2001).

Participation in planning is viewed as a tool for improving the efficiency of a project, assuming that where people are involved they are more likely to accept the new project and partake in its ongoing operation. It is also seen as a fundamental right; that beneficiaries should have a say about interventions that affect their lives (Pretty, 1995). Kumar (2002) asserts that participation in planning is a key instrument in creating self-reliant and empowered communities, stimulating village-level mechanisms for collective action and decision-making. It is also believed to be instrumental in addressing marginalization and inequity, through elucidating the desires, priorities and perspectives of different groups within a project area. Another study by Rosenberg (2004) shows that lack of participation in planning is potentially dangerous to project success because it can

breed lack of ownership on the part of the project beneficiaries. A study by Kernan & Hanges (2002) shows that participatory planning influences sustainability of small water projects.

In Uganda, Kaye & Kasasa (2004) noted that involving community members in planning for a water supply project may lead to positive project outcomes including operation and maintenance of water systems. Okeny (2004) has conducted research and shown that participation in planning lead to success of DANIDA community-based water project in Rakai District. Nakaseeta (2002) investigated the factors influencing sustainability of community-based water systems in Kayunga District, and found a significant positive relationship between participation in planning and sustainability of the water systems.

Overall, the empirical literature clearly indicates the importance of community participation in planning in community-based water project outcomes including operation and maintenance of such projects. The conclusion drawn from this review is that community participation in planning and operation and maintenance of water supply systems are positively related. However, much of this literature is based on western countries where participation in management of community-based water supply systems differs from that in developing countries like Uganda. Therefore, findings and recommendations drawn from such studies may not be applicable to countries like Uganda. In addition, the review of studies in Uganda revealed a glaring lack of specific indicators of community participation in planning, and how they are related to management of community-based resources. This study sought to contribute to

knowledge by investigating the influence of various dimensions of community participation in planning on the O&M of piped water supply systems in small towns in Eastern Uganda.

2.3 Community participation in Implementation and Operation and Maintenance of Water Systems

Different authors define community participation in implementation differently. Wan (2007) defines it as "the extent to which community members are involved in putting in action what they planned regarding a specific project or activity. Schermerhorn (2004) defines community participation in implementation as the extent to which community members are involved in carrying out, executing, or practicing of a plan, a method, or any design for doing a community project activity. As such, community participation in implementation is the community action that must follow any preliminary thinking in order for a community project activity to actually happen. Smith (1992) defines community participation in implementation in terms of community members being involved in contributing resources such as money, construction material, labor and time towards the execution of a community project. The definition of community participation in implementation is adopted from Schermerhorn (2004) and Smith (1992)—the extent to which community members are involved in carrying out and executing a community project by contributing money, construction materials, labor and time.

The water user community should be involved in all contracts governing the construction of water facilities. For instance, community members must know the contract price for transparency purposes, expected duration of construction, the responsibility of the

contractor and those of community members. In managing the contract, you are authorized to pass your complaints to the client or contracting agency through the extension staff or drilling supervisor. Complaints such as destruction of crops, unpaid services or misbehavior of the contracting personnel should be addressed. (A community resource book for water and sanitation sub sector 2007).

The community has to purchase the land on which the construction of the water system is to take place. Negotiation with land owners along the access route is necessary. The contractor is mandated to hire workers from the community and this empowers the community with skills. The community should monitor and follow up the construction work and take note of the quantities and qualities of materials delivered to the site., make sure that the work done meets the required standards (community and sanitation sector: District Implementation Manual 2007). In case of a well or piped water system being protected, there should be a catchment area, protected and fenced off, a drain for storm water and drainage for waste water flowing from the point of collection, a well-constructed concrete floor, retention wall, identification number indicated on the platforms and the water is expected to be clean. The districts and sub counties are expected to show evidence of their effort in putting health and sanitation ordinances and byelaws in place and implementing them at the same time.

According to Forrest & Richardson (2006), successful community participation in community based initiatives should take into account community members' contribution towards community project implementation. Aik & Tizzy (2006) state that community

participation in implementation of a community-based project should reflect members' contribution of resources towards the success of the project. Such resources may include money, labor, construction materials, and time among others. Therefore, successful community participation in implementation of community-based projects should be based on the ability of members to contribute the much needed resources.

Community participation in implementation is one of the major strategies for achieving community project success (Smit & Cronje, 2001). This suggests that there is a linkage between community participation in implementation and community project outcomes including operation and maintenance of community-based water supply systems. According to Konzil & McGrath (1996), community projects that elicit higher participation of members in their implementation are likely to experience higher success rates than those which elicit lower participation of community members. This is because community members feel a sense of ownership for the project which encourages them to work for its success. Also, Dockel (2003) argues that involving community members in the implementation of community projects is one way of showing them that their inputs are valued; which may compel them to work for its success.

However, some authors express a totally different opinion by arguing that community participation in implementation depends on whether their contribution is towards a technical or non-technical aspect (Bussin, 2002). Community participation in implementation may lead to success of the community project if the members'

involvement is restricted to non-technical aspects of the community project than the technical aspects (Bussin, 2002).

In spite of the contrasting theoretical arguments, most empirical evidence identified in literature shows a positive relationship between community participation in implementation and operation and maintenance of water supply systems. For instance, Samuel & Chin (2009) examined the extent to which participation in planning influences maintenance of piped water systems in both urban and semi-urban settings in South Africa. They found that participation in implementation among other factors such as availability of complementary resources and technical experience of project operators were significant correlates of maintenance of piped water supply systems. Pate & Martinez (2000) find that participation in project implementation elicits positive responses from project beneficiaries and contributes positively to the success of community-based projects. Banakus & Angel (2003) reported results reflecting positive association between community involvement in community projects and their success, while Choo & Boze (2007) also found that allowing community members to effectively participate in construction of community water projects increases the chances their sustainability.

In Uganda, Kasekende (2005) found that willingness of community members to contribute resources such as land and construction materials was one of the major factors explaining successful implementation of community-based water systems in Kasanda Sub County in Mubende District. In addition, Okello (2006) noted that encouraging

participation of community members in the implementation of community activities guarantees the sustainability of community activities. However, the author's claims were not based on empirical findings.

Overall, the review of literature overwhelmingly suggests a positive relationship between community participation in implementation and community project outcomes including operation and maintenance of water systems. Therefore, the study tested the hypotheses that community participation in implementation significantly influences operation and maintenance of piped water supply systems in small towns in Eastern Uganda. The results are presented in chapter four.

2.4 Community Participation in Monitoring and Operation and Maintenance of Water Supply Systems

Sartin (2003) defines community participation in monitoring as the extent to which community members are involved watching over a community project to ensure that it keeps on course. According to Jacobson (2008), involving community members in monitoring a community project is one of the best ways of ensuring that it remains on course. In the case of this study, involving community members in monitoring of the piped water supply systems is one of the best ways of ensuring their survival. .

In order to make community participation in monitoring more effective, it should be tied to the expected benefits of the community project. Heathfield (2008) proposes that communities should prioritize monitoring of community projects to guarantee their future survival and sustainability of benefits. According to Heathfield (2008), community based

projects in which beneficiaries are highly involved in their monitoring, have higher chances that those where there is low participation in monitoring.

Community participation in monitoring of community projects is desired because it has a positive impact on the project success. Nelson (2003) found evidence to support the link between community participation in monitoring and its impact on success of community based projects. A study conducted by Johnson (2000) shows that most commonly cited factor that led to collapse of community projects was a lack of community participation in their implementation. Sartin (2003), Bruce & Pedro (1999), Jordan & Evans (2005), Adams et al (1998), and Heathfield (2008) all find empirical evidence supporting the positive effect of community participation in monitoring on success of community-based projects.

In Uganda, some studies have been conducted about participation in monitoring on management of community-based resources. For instance, Musenze and Mwebaze (2003) found that collapse of community-based buildings in Lira District was partly attributed to weaknesses in community monitoring, while Sekajo (2006) found that community-based water projects in Kalangala District were failing because of lack of involvement of community members in monitoring the projects.

Overall, the literature review depicts a positive relationship between community participation in monitoring and success of community-based projects. Therefore, this study tested the hypothesis that community participation in monitoring significantly

influences the operation and maintenance of piped water supply systems in small towns in Eastern Uganda, and the results are presented in the analytical chapter of this report.

2.5 Summary of Literature Review

This chapter has reviewed both the theoretical and empirical literature related to community participation and operation and maintenance of water systems. Overall, the review of literature has clearly shown that community participation constructs such as planning, implementation and monitoring are related to operation and maintenance of water systems. Therefore, it has provided a backing for the research hypotheses outlined in section 1.5 of the first chapter. These hypotheses were tested and the results presented in the analytical chapter of this report.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter presents the methods and procedures used in conducting this study in the following sections: research design, study population, sample size and selection, data collection methods, data collection instruments, validity and reliability of instruments, data collection procedure, and data analysis techniques.

3.1 Research Design

A cross-sectional survey design was used in examining the influence of community participation on operation and maintenance of piped water supply systems in small towns in Eastern Uganda. The design was about studying various variables related to community participation and O&M within a short period of time as highlighted by Amin (2005). The design was adopted because it enabled the researcher to base on data collected from a sample to make inferences about a population of interest, and the impossibility of collecting data from the entire population of interest given the time limit for completing the course as supported by Sekaran (2003). In addition, a mixture of quantitative and qualitative approaches was used in collecting and analyzing data. Using a mixture of approaches was adopted because it overcomes the limitations or weaknesses accruing to use of a single approach and thus, it increases the validity of the results as supported by Denscombe (2003).

3.2 Study Population

The unit of analysis in this study was small towns; therefore, the target population constituted all beneficiaries of piped water supply systems in small towns in Eastern Uganda including households, local community leaders, private operators of the water systems, and piped water supply management committee members in the small towns. According to the Ministry of Water and Environment (2010), 622 households in small towns in eastern Uganda were beneficiaries of piped water supply systems including: 113 in Kamuli town, 97 in Nawanyago town, 94 in Pallisa town, 106 in Tirinyi town, 89 in Nankoma town, and 123 in Busembatia town. The local community leaders in the areas with piped water supply systems were six (6) while the private operators of the piped water supply systems were ten (10). The piped water supply management committee members were fifty (50). Together, the size of the study population was 688.

3.3 Sample Size and Sampling Technique

The study was based on a total sample of 252 individuals. This sample size was determined using the mathematical formula developed by Yamane in 1967, which is as follows:

$$n = \frac{N}{1 + Ne^2}$$

Where: n = Desired sample size

N = Population size

e = Level of significance (measured at 0.05 or 5%)

Therefore, by the above formula, the sample size was calculated as follows:

$$n = \frac{688}{1 + 688(0.05)^2} = 252$$

A combination of probability and non-probability sampling techniques were used in selecting sample subjects. Under probability sampling, the technique of stratified proportional random sampling was used in selecting the 211 household heads. This involved dividing the households into six mutually exclusive groups based on the small towns, and then drawing a random sample of households from each group which was proportional to the size of a particular group. By this technique, 38 household heads were selected from Kamuli town, 34 were selected from Nawanyago town, 32 were selected from Pallisa town, 36 were selected from Tirinyi town, 30 were selected from Nankoma town, and 41 were selected from Busembatia town; together giving a total sample of 211 household heads. Given that the towns differed in terms of the number of households, this technique ensured selection of a representative sample from each town. Further still, under the probability sampling, the technique of simple random sampling was used in selecting the 25 Water Management Committee members. The technique was used because it allows generalizing of results to the target population with a margin of error that is statistically determinable.

Under non-probability sampling, the technique of census was used in selecting the 6 Local Community Leaders and 10 Water System Private Operators respectively. This technique involved using the researcher's personal judgment or common sense to choose sample subjects from whom information was collected. The technique was used because of the researcher's belief that these individuals were highly knowledgeable about issues under investigation; and therefore, their input was of complementary value. Table 1

presents a summarized description of the target population and the corresponding sample size and sampling techniques.

Table 1: Description of sample size determination and sampling technique

Population	Population size	Sample size	Sampling technique
Household heads	622	211	Stratified propotional random sampling
Local community leaders	6	6	Census
Private operators	10	10	Census
Water management committee members	50	25	Simple random sampling
Total	688	252	

Source: Ministry of Water and Environment, Kampala

3.4 Data Collection Methods

Both primary and secondary data collection methods were employed in this study. Primary data collection methods were used in collecting primary data through questionnaire administration, interviews, and observation. Secondary data collection methods were used in collecting secondary data through reviewing documents relevant to the study. The description and use of the methods is explained in detail in the following sub-sections.

3.4.1 Questionnaire survey

Questionnaire method was employed as the major data collection method. It involved collecting primary data from household heads through face-to-face interviews, where interviewers presented items orally. The choice of the method was because it is a quick method of data collection (Mugenda & Mugenda, 2003). In addition, Amin (2005) notes that the method is less time consuming since it can adequately cover the entire sample

within the proposed time frame, and it offers greater assurance of anonymity, especially if the researcher is handling sensitive issues like poor operation and maintenance of piped water supply systems.

3.4.2 Interviews

This involved engaging in conversation with one or more people where questions were asked by the interviewer to elicit facts or statements from the interviewee as supported by Sekaran (2003). The researcher conducted interviews with key informants (such as local community leaders, private operators and water management committee members) using an interview guide composed of standardized, open-ended questions. The use of standardized open-ended questions was intended to ensure that the same questions are asked to all interviewees and that the same general information is collected from each interviewee. According to Amin (2005), interviews are a useful method of providing more focus, investigating issues in an in-depth way, discovering how individuals think and feel about a topic and why they hold certain opinions. Interviews also deepen understanding of the issue under investigation and ensure that respondents seek clarity and permit a researcher to follow up leads and obtain more data (Amin, 2005).

3.4.3 Observation

Observation is a method of collecting data which involves watching behavior, events, or noting physical characteristics in their natural setting (Sekaran, 2003). This method was used in watching the actual participation behavior in the management of the water supply systems and the actual condition of the water supply systems in terms of their functionality. The justification for using this data collection method was that it enabled

the researcher and the assistants to directly see what people do or the actual state of the water systems rather than rely only on what people said.

3.5 Data Collection Instruments

Questionnaires, interview guides, and observation checklists were used as the main instruments of data collection. The following sub-sections present a description of the instruments.

3.5.1 Questionnaire

A self-administered questionnaire was employed as the major data collection instrument where a total of 211 sets were administered for a period of 2 weeks in the six small towns in Eastern Uganda. The questionnaires comprised of closed-ended questions which restricted respondents to a fixed set of answers from which to choose. Closed-ended questions were adopted because they are considered easier and faster to answer, and they are also easier to code and analyze statistically (Amin, 2005). The questionnaires had five sections on socio-demographic characteristics, operation & maintenance, community participation in planning, community participation in implementation and community participation in monitoring of piped water supply systems. Questionnaires were used because the study was concerned with variables that were unobservable such views, perceptions, and attitudes of respondents community participation in planning, implementation, monitoring and O&M of water supply systems. A sample of the questionnaire can be found in Appendix I of this report.

3.5.2 Interview guide

In addition to the structured questionnaire, the study employed an interview guide to collect qualitative data through face-to-face interviews with selected political leaders,

water facility private operators and water management committee members in the areas of study. These were purposively chosen because they were the major players concerned with issues of community participation and operation and maintenance of piped water supply systems in the area; thus, their views and opinions were considered of complimentary value into this study. The instrument was constructed following recommendations of Amin (2005), who noted that open-ended questions allow respondents to give information in detail (see Appendix 2).

3.5.3 Observation checklist

An observation checklist was one of the instruments that were employed for data collection in this study. It included a list of items related to the current topic that the researcher physically looked at when conducting the investigation such as status of pipes and their fitting and general cleanliness (see Appendix 3).

3.6 Validity and Reliability of Instruments

3.6.1 Validity

Two experts from the Ministry of Water and Environment in the area of operation and maintenance of rural water supply systems were asked to rate each questionnaire item based on relevance, clarity, simplicity and ambiguity on the four-point scale. Content Validity Index (CVI) for each item was determined. Table 2 summarizes results of validity analysis.

Table 2: Results of validity analysis

Concept	No. of items before computing CVI	No. of items after computing CVI
Community participation in planning	10	6
Community participation in implementation	7	4
Community participation in monitoring	8	5
Operation and maintenance	11	9
Total	**36**	**24**

Source: Primary data

Table 2 shows out of 36 items, only those with CVI over 0.75 remained and the rest were discarded as indicated in Amin (2005), resulting to 24-item scale. These were the items that were finally considered in the questionnaire.

3.6.2 Reliability

The reliability of the questionnaire was established through calculating the Cronbach Alpha value. Cronbach's Alpha coefficient ranges from 0 to 1, with higher values indicating greater reliability. Table 3 shows a summary of the results of reliability analysis.

Table 3: Results of reliability analysis

Concept	No. of items	Cronbach's Alpha
Participation in planning	6	0.77
Participation in implementation	4	0.89
Participation in monitoring	5	0.81
Operation & maintenance	9	0.73

Source: Primary data

The results of the analysis in the table indicate an average Cronbach's Alpha coefficient for the variables that ranges from 0.73 to 0.89. Based on guidelines by Creswell (2005), this implies that the items adopted in the questionnaire were deemed highly reliable. Creswell (2005) suggested four cut-off points for reliability including: excellent reliability (0.90 and above), high reliability (0.70-0.90), moderate reliability (0.50-0.70) and low reliability (0.50 and below).

3.7 Measurement of Variables

The major variables under consideration in this study included community participation in planning, community participation in implementation, community participation in monitoring and operation and maintenance. Community participation in planning was measured using six items that sought respondents' perceptions on their level of involvement in water-related meetings, water need assessment, technology identification and water site identification.

Community participation in implementation was measured using four items that sought respondents' opinions on their level of involvement in contributing money, materials, construction labor, and time towards the management of piped water supply systems in the area. Community participation in monitoring was measured using five items that sought respondents' perceptions on their level of involvement in water site inspection, water site security and reporting functionality status of the water systems.

Operation and maintenance was measured using 9 items that sought respondents' views on the functionality and working conditions of the piped water supply systems in their

areas. All the items corresponding to these variables were largely adopted from previous researchers (Rosenberg, 2004; Folscher, 2004; Choo & Boze, 2007; Heathfield, 2008; Cubillo, 2003) and where necessary, some were modified to suit the current study.

3.8 Data Collection Procedure

The researcher employed two research assistants to administer the questionnaire. This was because the study covered a wide area yet time was limited. The assistants were coached in areas of data collection, data entry and the general ethical conduct before dispatching them to the field. This ensured efficiency and effectiveness in the data collection exercise. For purposes of gaining audience with community members, each assistant was given a photocopy of the introduction letter from Uganda Management Institute containing the study purpose and objectives. The research assistants were instructed to distribute the self-administered questionnaires to the respondents and pick them later at an agreed time upon filling them completely. This ensured that respondents got ample time to internalize the questions and make appropriate responses.

3.9 Data Analysis

The study employed both quantitative and qualitative data analysis techniques. These are explained in the following sub-sections.

3.9.1 Quantitative analysis

Quantitative data were scrutinized, cleaned, coded, entered into a Microsoft Office Excel computer program and analyzed using the Statistical Package for Social Scientists (Version 18.0). In addition, descriptive statistics such as frequencies and percentages were used in describing responses to items on community participation and operation and

maintenance, while the Pearson's correlation coefficient (r) was used to investigate the relationship between the independent variables and the dependent variable as outlined in the objectives and to test hypotheses between the independent and dependent variables. In addition, regression analysis was used to compute the coefficient of determination (r^2), which was used to determine the percentage by which a change in the independent variable would lead to a change in the dependent variable.

3.9.2 Qualitative analysis

The qualitative data obtained through interviews and focus group discussions were analyzed basing on the following five recommended steps by Creswell (2005): (i) themes were identified in the data, (ii) redundant information deemed to lack a direct or indirect bearing on the themes were eliminated, (iii) themes were classified into major categories, (iv) major categories were clustered into sub-categories with their concrete meaning being transformed into the language of science, and (v) categories and sub-categories from all questions of the interview and focus group discussion were integrated into a total description of the effect of community participation on operation and maintenance of piped water supply systems in small towns in Eastern Uganda.

CHAPTER FOUR

PRESENTATION, ANALYSIS AND INTERPRETATION OF RESULTS

4.0 Introduction

In this chapter, the findings are presented, analyzed and interpreted in six sections namely: response rate, descriptive analysis of respondents' perceptions on O&M of piped water systems, levels of community participation in planning and O&M of piped water supply systems, levels of community participation in implementation and O&M of piped water supply systems, and levels of community participation in monitoring and O&M of piped water supply systems.

4.1 Response Rate

A total of 252 individuals were targeted to participate in this study including 211 questionnaire respondents and 41 interviewees. Table 4 presents results concerning the response rate.

Table 4: Response rate

	Target number	**Realized number**	**Realized percent**
Questionnaire respondents	211	199	94.3
Interviewees	41	25	60.9
Total	**252**	**224**	**88.8**

Source: Primary data

The findings show that 199 out of 211 individuals successfully filled the questionnaires, representing a response rate of 94.3%. In addition, 25 out of 44 interviewees were

realized, representing a response rate of 60.9%. Together, a total of 224 questionnaire respondents and interviewees were realized, representing a response rate of 88.8%.

4.2 Descriptive Analysis of O&M of Piped Water Supply Systems

Since O&M was a common factor in all the study objectives, it was important to first establish the current status of O&M of the water systems and then determine how the level of community participation in planning, implementation and monitoring were related to it. Table 5 presents a summary of the findings on respondents' views on O&M of piped water supply systems in small towns in Eastern Uganda.

Table 5: Respondents views on operation & maintenance of piped water systems

Items on O&M	N	SA (%)	A (%)	DA (%)	SDA (%)
Piped water is always available whenever needed	199	30 (15)	52 (26)	88 (44)	29 (15)
Water system generates sufficient water for users	199	27 (13)	19 (10)	75 (38)	78 (39)
Quality of piped water is always good	199	21 (10)	78 (39)	44 (23)	56 (28)
Water system components always in good condition	199	13 (7)	57 (28)	89 (45)	40 (20)
Piped water system catchment area regularly cleaned	199	6 (3)	34 (17)	70 (35)	89 (45)
Water system routinely examined to detect faulty conditions	199	11 (6)	75 (37)	42 (21)	71 (36)
Water system mechanical parts regularly greased	199	24 (12)	70 (35)	47 (24)	58 (29)
Minor breakdowns in water systems immediately repaired (within 24 hrs)	199	31 (15)	61 (31)	38 (20)	69 (34)
Major breakdowns in water systems promptly addressed (within 3 days)	199	20 (10)	32 (16)	45 (23)	102 (51)

Notes: SA=strongly agree, A=agree, DA=disagree, SDA=strongly disagree; Source: Primary data

For easier management of data, responses to the 9 items on O&M reflecting 'strongly agree' and 'agree' were combined into 'agree,' while 'strongly disagree' and 'disagree'

responses were combined into ‘disagree.’ Therefore, the findings in Table 5 show that a combined total of 117 respondents (59%) disagreed that that water from the systems is always available whenever it is needed, while 82 respondents (41%) agreed with the statement. This finding means that piped water supply in the areas studied is irregular, which suggests that piped water supply systems are rarely functional, hence low O&M.

In addition, 153 respondents (77%) disagreed with the statement that the piped water systems generate sufficient water for users compared to 64 respondents (23%) who agreed with the item. This finding means that the piped water supply systems in the areas studied generate insufficient water, which suggests ill-functionality of the water systems, hence poor O&M.

Furthermore, 110 respondents (51%) disagreed with the statement that the quality of water from piped water supply systems is always good as opposed to 99 respondents (49%) who agreed. The finding implies that piped water supply systems in the areas studied generate poor quality water, which suggests poor functionality, hence low O&M.

It can also be seen from the table that 129 respondents (65%) disagreed with the item that the water supply system components are always in good condition as compared to 70 respondents (35%) who agreed with this item. This finding suggests that the water supply systems in the areas investigated are rarely in good working conditions, hence low O&M.

Table 5 also shows that 159 respondents (80%) disagreed with the statement that the piped water system catchment areas are regularly cleaned while only 40 respondents (20%) agreed. This finding implies that the hygiene of the water system catchment areas is poor, which can contribute to poor working conditions of the water system, hence poor O&M.

When asked for their opinion on whether the water system mechanical parts are regularly greased, 105 respondents (53%) felt that they are not. This contributes to poor working condition of the water system, hence poor O&M. Finally, the findings in the table show that 147 respondents (74%) disagreed with the statement that major break downs in the water system are always promptly addressed at least within 3 days, further causing poor working conditions of the water system, and consequently low O&M. Overall, the results show that the functionality and working condition of piped water supply systems in small towns in Eastern Uganda is poor, hence poor O&M of the water system.

In addition, qualitative data on O&M of piped water supply systems generated through interviews with some key informants was consistent with the quantitative findings. Two major themes emerged from this data: (i) the piped water systems function poorly most of the time, and (ii) they are usually in poor condition for much of the time. Under poor functionality of the piped water supply system, one community leader had this to say:

> "Most of our people using water from the pipes are not happy because water supply from the systems is always on and off, and even sometimes, the color and

taste of water we draw from the systems when they are working is not good" **(Respondent 4)**.

Another community leader had this to say:

> "One of the lessons I have learnt from these piped water systems is that it is not good to entirely rely on them because they have many problems. Most importantly, most of the time, the systems is not functional" **(Respondent 6)**.

It was also said by another community leader that:

> "It is true many piped water systems in the area are not working as expected; some generate insufficient water, others have completely broken down and lying abandoned in the bushes" **(Respondent 1)**.

From the qualitative results presented above, it is clear that water supply from the systems is often inconsistent, inadequate and of poor quality, which implies poor functionality of piped water supply systems in the areas of study; hence, poor O&M of the water systems.

Under the theme of poor condition of the piped water supply systems, a Water Management Committee member had this to say:

> "We are disappointed with people in charge of repairing the systems. You find that when a system has developed a mechanical problem, even when it looks a simple one to fix, it takes long, sometimes 5 – 6 months to rectify the problem" **(Respondent 16)**.

In addition, one of the Private Operators had this to say:

"The quality of water system components seems questionable because most of the time you find that they are spoiled easily shortly after being replaced, so they hardly work regularly" **(Respondent 8)**.

The findings show that the piped water systems are hardly repaired immediately when they break down and they hardly function regularly, which implies they are often in a poor working condition, hence poor O&M of the water systems.

It was also observed by the researcher that out of the 12 piped water supply systems that were visited, 4 were non-functional and had completely broken down, while 6 of the functional water systems were unhygienic, characterized by muddy and bushy surfaces as evidenced by a sample of the following figures.

Figure 2: A non-functional hand pump in Tirinyi in Kibuku District

Figure 3: A non-functioning hand pump in Nankoma Town in Bugiri Distrct abandoned in a bushy area

Overall, the findings obtained through questionnaire survey, face-to-face interviews and observation clearly showed that the status of O&M of piped water supply systems in small towns in Eastern Uganda was found poor, characterized poor functionality and working condition of the systems. The purpose of this study was to examine the relationship between the levels of community participation in planning, implementation, and monitoring and the O&M of piped water supply systems in the surveyed areas as stipulated by the study objectives. The results concerning the objectives are presented in the following sections.

4.3 Community Participation in Planning and Operation & Maintenance of Water Supply Systems

The first research question sought to find out the relationship between levels of community participation in planning and the O&M of piped water systems among households in small towns in Eastern Uganda. To answer this question, first, respondents

in the selected study areas were asked to react to several statements intended to measure the level of community participation in planning for the water systems. The responses to these items were rated on a 4 point likert scale ranging from 1=strongly disagree to 4=strongly agree. Table 6 presents a summary of the findings concerning respondents' views on the level of community participation in planning for the piped water supply systems.

Table 6: Respondents' views on community participation in planning

Items on community participation in planning	N	SA (%)	A (%)	DA (%)	SDA (%)
Members are invited to attend meetings on water supply matters	199	48 (24)	72 (36)	28 (14)	51 (26)
Members' ideas are respected and listened to in the meetings	199	46 (23)	32 (16)	54 (27)	67 (34)
Members decide key issues on matters of the water supply systems	199	10 (5)	22 (11)	47 (24)	120 (60)
Members are involved in identifying the appropriate water technology	199	3 (2)	9 (4)	98 (49)	89 (45)
Members are involved in identifying the appropriate site of the water system	199	21 (10)	23 (12)	79 (40)	76 (38)
Members are involved in determining water provision action plans	199	14 (7)	24 (12)	59 (30)	102 (51)

Notes: SA=strongly agree, A=agree, DA=disagree, SDA=strongly disagree; Source: Primary data

In order to easily manage the data analysis process, responses in the form of 'strongly disagree' and 'disagree' were integrated into 'disagree', while responses in the form of 'strongly agree' and 'agree' were integrated into one component 'agree.' The findings in Table 6 show that 120 respondents (60%) agreed with the statement that community members are usually invited to attend meetings on water supply matters. However, 121 respondents (61%) disagreed with the statement that community members' ideas are respected and listened to during the meetings. When asked whether they decide key

issues on matters of piped water supply systems, 167 respondents (84%) disagreed with the statement. These findings imply that community members' involvement in meetings discussing issues related to the water supply systems was low. Yet, it is through such meetings that, for instance, the roles of the different parties in the management of the water systems are conceived, agreed upon and adopted; therefore, if community members' involvement in these meeting is low, the different parties could negate on their roles, which in turn, negatively affects the functionality and working condition of the water supply systems.

Table 6 also shows that 187 respondents (94%) disagreed with the statement that community members are involved in identifying the appropriate water system technology. Similarly, 155 respondents (78%) felt that they were not involved in identifying the appropriate sites for the water systems. These findings mean that community members' involvement in determining appropriate water system technologies and water system sites was low. With this low level involvement in the above issues, it implies that inappropriate water system technologies and water system sites may be chosen, which in turn could negatively affect the functionality and working condition of the water systems.

Indeed, three themes that emerged out of qualitative data obtained through face-to-face interviews with key informants were: the level of community members' involvement in meetings called to discuss issues related to water supply systems is low because members' ideas are usually ignored in decision-making, community members'

involvement in meeting is low because of lack of information, and involvement in planning meetings is low of because of disregard for community members' preferences. Under the theme of low involvement in meetings due to low consideration of members' ideas, one of the community leaders said:

> "The ideas discussed in meetings are not usually presented by members; instead, technical people conceive them and impose them on members to rubber stamp them. The views of the members are rarely listened to and considered in the final decisions made. At the end of the day, members don't feel they own the water projects; hence, they do little to take good care of the projects. That is why you find that quite a good number of these water facilities are either not working or completely spoiled" **(Respondent 5)**.

Another respondent pointed out that:

> "Members in this community have little attachment to the piped water systems because they feel their views are not given attention. As a result, they care less for the water systems, which leads to frequent breakdowns in the systems" **(Respondent 17)**.

There was also a respondent who intimated that:

> "The community members are not involved in community decision making. The leaders only call members to attend meetings to enforce pre-determined ideas; but not to discuss the ideas" **(Respondent 10)**.

The data presented above means that the level of community members' involvement in meetings called to discuss water systems issues is low because their ideas are usually less listened to and given low consideration. Therefore, members have less attachment to,

ownership of and care for the water projects. In addition, they offer less care for the water projects, which leads to poor functionality and working condition of the water systems.

Under the theme of low community involvement in water-related meetings due to lack of information, one of the respondents noted that:

> "Most of the time, members who attend these meetings play a passive role because they are not adequately informed about these water projects so that they can contribute ideas which will be considered in the decisions made" **(Respondent 11).**

Clearly, this finding implies that the lack of information on the part of members may lead to adoption of ill-informed and inappropriate water system-related decisions, which in turn, may be associated with the current poor status of functionality of the water systems in the surveyed areas.

Under the theme of low community involvement due to disregard of community members' preferences, one of the respondents had this to say:

> "People in this area prefer yard taps to boreholes because the former are relatively easier to manage as breakdown less frequently. But, as you can see, the one borehole we have in this area, which by the way is recent, is not working while the yard tap which was constructed about two years ago is still working" **(Respondent 8)**.

In addition, there was a respondent who reported that:

> "People had originally preferred that the borehole be placed close to where people stay as this would be easier to monitor and secure. But I don't know why they placed the borehole very far away from the places where people stay. Because of this, it is very difficult to secure the water system, so some unscrupulous individuals come at night and steal some of the water system component parts, which renders some of these systems non-functional for most of the time. Remember, replacing these components is expensive" **(Respondent 17)**.

The findings clearly imply that disregarding community members' preferences leads to imposition of ideas which are disliked and disrespected, further leading to the current poor functional status of some of the piped water supply systems in the areas.

Overall, the quantitative results presented in Table 6 and the qualitative results generated through face-to-face interviews with key informants clearly show that the level of community participation in planning was found to be low, which may have an effect on the current poor status of O&M of the piped water supply systems in the surveyed areas.

In order to determine to statistically determine relationship between the levels of community participation in planning and the O&M of piped water supply systems, the average score for items on the level of community participation in planning was correlated with the corresponding average score value for items on O&M. This data was correlated under the following hypothesis: "there is no significant relationship between the level of community participation in planning and the operation and maintenance of

piped water systems among households in small towns in Eastern Uganda." Table 7 presents a summary of the findings.

Table 7: Correlation--community participation in planning and O&M

Variable		Operation & maintenance	Level of community participation in planning
Operation & maintenance	Pearson's Correlation	1	0.667
	Sig (2-tailed)		0.035
Level of community participation in planning	Pearson's Correlation	0.667	
	Sig (2-tailed)	0.035	1

Source: Primary data

The results in Table 7 show a Pearson's correlation coefficient of 0.667 and a probability value of 0.035, which is less than the pre-determined significance level of 0.05. This finding means that there was a significant positive relationship between community participation in planning and the O&M of piped water supply systems. That is, the lower the level of community participation in planning, the poorer the status of O&M of the piped water supply systems, and the higher the level of community participation in planning, the better the status of O&M of the piped water supply systems. Therefore, the pre-formulated null hypothesis was rejected, and it was concluded that indeed, there was a significant positive relationship between the level of community participation in planning and the current status of O&M of piped water supply systems.

However, the Pearson's correlation coefficient could not determine by how much a positive change in the level of community participation in planning would lead to a positive change in the status of O&M of the piped water supply systems. Therefore,

regression analysis was further conducted to compute the coefficient of determination that could be used in determining the percentage of the total variation in the dependent variable that could be explained by the independent variable. The results are summarized in Table 8.

Table 8: Regression--community participation in planning and O&M

$R = 0.667$, $R^2 = 0.444$, Adjusted $R^2 = 0.442$ $F = 64.904$, Sig. $F = 0.000$					
Variables in the model	**Unsatandardized coefficients**		**Standardized coefficients**	***T***	***ρ*-level**
	β	Std. Error	Beta		
(Constant)	4.226	1.745		2.421	0.003
Community participation in planning	0.488	0.146	0.667	3.343	0.035

a. Dependent variable: Operation and maintenance of piped water supply systems

The results in the table show a coefficient of determination (r^2) of 0.444. When expressed in percentage, this finding means that, holding other factors constant, increasing the level of community members' participation in planning through increasing their involvement in water-related meetings, assessing water needs in the area, identifying the appropriate water system technology, and identifying the appropriate water system sites would lead to a positive change in the O&M in terms of the functional status and working condition of the piped water supply systems in the surveyed areas by approximately 44.4%. The *F*-statistic (64.904) was significant at the 5% level, showing that the regression coefficient was significantly different from zero. Therefore, community participation in planning was found to be a significant predictor of O&M of piped water supply systems among households in small towns in Eastern Uganda.

4.4 Community Participation in Implementation and Operation & Maintenance of Water Systems

The second research question sought to establish the relationship between level of community participation in implementation and the operation and maintenance of piped water systems in small towns in Eastern Uganda. To answer this question, household heads were first asked to respond to several statements intended to measure their level of community participation in implementation in terms of their willingness to contribute money, materials, labor and time towards managing the water systems. Table 9 presents a summary of the findings concerning respondents' views on the level of community participation in implementation of the water systems.

Table 9: Respondents' views on community participation in implementation

Items on community participation in implementation	N	SA (%)	A (%)	DA (%)	SDA (%)
Willing to contribute money for constructing and caring for water facility	199	23 (11)	55 (28)	81 (41)	40 (60)
Willing to contribute materials used in constructing piped water systems	199	12 (6)	32 (16)	56 (28)	99 (50)
Willing to spare time to attend to management of piped water systems	199	20 (10)	62 (31)	48 (24)	69 (35)
Willing to contribute free labor into constructing the piped water systems	199	11 (6)	43 (22)	42 (20)	103 (52)

Notes: SA=strongly agree, A=agree, DA=disagree, SDA=strongly disagree; Source: Primary data

Like in the previous section, responses in the form of 'strongly disagree' and 'disagree' were combined into 'disagree', while responses in the form of 'strongly agree' and 'agree' were integrated into one component 'agree' for easier data analysis management. The findings in Table 9 show that 121 respondents (61%) disagreed with the statement that they were always willing to contribute money needed in constructing and taking care

of the piped water supply systems. In addition, 155 respondents (78%) were unwilling to always contribute materials used in constructing piped water supply systems. When asked whether they were willing to spare time to attend to matters related to the management of piped water systems, 117 respondents (59%) did not agree with this particular item. Finally, the results in the table show that 145 respondents (73%) were not always willing to contribute free labor needed in constructing and caring for the piped water supply systems.

The above findings imply that the community members' participation in implementation was low since most of them were less willing to contribute money, materials, labor and time into activities related to implementing the water systems. When community members are less willing to contribute money, materials, labor and time, it means that the water catchment areas for the water systems will not be regularly cleaned, and that spoiled mechanical parts of the water systems will not be immediately replaced, leading to non-functionality and poor working condition of the systems; hence, poor O&M of the systems.

Some of the findings generated through face-to-face interviews with key informants were in agreement with the above quantitative findings. For instance, when respondents were asked to comment about the level of community members' participation in implementation of activities related to piped water systems, three themes emerged from the responses: unwillingness to contribute resources because of corruption, unwillingness to contribute resources because of poverty and unwillingness to contribute resources

because of lack of compensation. Under the theme of unwillingness to contribute resources due to corruption, one of the respondents had this to say:

> "Some people used to collect money from us, claiming to use it for repairing broken-down water systems, but they hardly used it for repair purposes; instead, they would eat the money. Even today, people are not willing to contribute money because they believe the money is diverted to satisfy needs of collectors. That's partly why some systems remain unattended to" **(Respondent 6)**.

Another respondent reported that:

> "People would be very willing to contribute money for repairing water taps but they fear it will be eaten, and yet there are no proper mechanisms of holding such people accountable. So there is lack of enough money to repair spoiled taps" **(Respondent 20)**.

The qualitative findings above clearly demonstrate that the functional and working condition of piped water supply systems in the survey areas may be poor partly because of community members' unwillingness to contribute money required in repairing broken-down water systems as the money collectors were perceived to be corrupt.

Under the theme of unwillingness to contribute resources because of poverty, one of the respondents said:

> "Most people in this community are low income earners who can not afford when asked to contribute money to help in construction and looking after the piped water systems. So, having water systems that function regularly is extremely hard" **(Respondent 19)**.

The finding shows that unwillingness to contribute money due to poverty witnessed in some of the survey areas may be responsible for the non-functionality of some the piped water supply systems in those areas.

Under the theme of unwillingness to contribute resources because of lack of compensation, there was a respondent reported that:

> "We often mobilize people to clean areas near the water systems, but very few turn up as the rest claim the have other more important businesses to attend to. So, it is difficult to complete all the work we wish to cover. That's why you see that some areas near the water sources are so bushy" **(Respondent 14)**.

There was also a respondent who intimated that:

> "We have asked the District authorities to introduce attendance allowances as a way encouraging community members to attend to meetings and activities aimed at discussing and working on important issues such as looking after water systems. However, this has not been forthcoming, that's why effective management of community-based water services remains a big challenge" **(Respondent 9)**.

Added to the above respondents, another respondent added that:

> "People care less about water-related issues because they assume there is hardly any gain out of doing so" **(Respondent 18)**.

The results above imply that community members' willingness to contribute resources because of lack of compensation may be partly responsible for the poor functional status and working condition of piped water supply systems in some of the surveyed areas.

Overall, the above quantitative and qualitative findings clearly showed that the level of community participation in implementation of piped water supply systems was generally low, characterized by low community members' willingness to contribute resources needed in constructing and caring for piped water supply systems. This can lead to low O&M of the water systems.

In order to statistically establish the relationship between level of community participation in implementation and the O&M of the piped water systems, data in Table 9 was aggregated into a single value representing level of community participation in implementation and correlated with an index value representing O&M. The correlation test was conducted under the following hypothesis: 'there is no significant relationship between level of community participation in implementation and O&M of piped water supply systems among households in small towns in Eastern Uganda. The findings are summarized in Table 10.

Table 10: Correlation--community participation in implementation and O&M

Variable		Operation & maintenance	Level of participation in implementation
Operation & maintenance	Pearson's Correlation	1	0.592
	Sig (2-tailed)		0.018
Level of Participation in implementati-on	Pearson's Correlation	0.592	
	Sig (2-tailed)	0.018	1

Source: Primary data

From the table, the correlation coefficient between the level of community participation in implementation and O&M was 0.592 and the corresponding probability value was

0.018. This finding implies that there was a significant positive relationship between community participation in implementation and O&M of the piped water supply system. That is, the lower the level of community participation in implementation characterized by low community members' willingness to contribute resources such as money, materials, labor and time, the poorer the functional status and working condition of piped water supply systems, and the higher the level of community participation in implementation characterized by high community members' willingness to contribute resources such as money, materials, labor and time, the better the functional status and working condition of piped water supply systems. Therefore, the pre-formulated null hypothesis was rejected, and it was concluded that there was a significant positive relationship between the level of community participation in implementation and O&M of the piped water supply systems.

Since the correlation coefficient could not determine by how much a change in community participation in implementation would explain the status of the current O&M of the piped water supply systems, the researcher conducted regression analysis and computed a coefficient of determination (r^2) which was used to determine the percentage by which the current status of O&M of the piped water supply systems would improve as a result of a positive change in the level of community participation in implementation. The results are summarized in Table 11.

Table 11: Regression--community participation in implementation and O&M

$R = 0.592$, $R^2 = 0.350$, Adjusted $R^2 = 0.298$ $F = 15.457$, Sig. $F = 0.000$					
Variables in the model	**Unsatandardized coefficients**		**Standardized coefficients**	***T***	***ρ*-level**
	B	Std. Error	Beta		
(Constant)	4.267	1.452		2.968	0.006
Community participation in implementation	0.473	0.356	0.592	1.329	0.018

a. Dependent variable: Operation and maintenance of piped water supply systems

The findings in the table show a coefficient of determination (r^2) stood at 0.35. This finding implies that, holding the other factors constant, a positive change in the level of community participation in implementation, through encouraging community members to contribute money, materials, labor and time would lead to an improvement in the current status of O&M of piped water supply systems in the surveyed areas by 35%. The *F*-statistic (15.457) was significant at the 5% level, showing that the regression coefficient was significantly different from zero. Therefore, community participation in implementation was found to be a significant predictor of operation and maintenance of piped water supply systems among households in small towns in Eastern Uganda.

4.5 Community Participation in Monitoring and Operation and Maintenance of Water Supply Systems

The final research question sought to determine the relationship between level of community participation in monitoring and the operation and maintenance of piped water systems among households in small towns in Eastern Uganda. To answer this question, respondents were asked to react to several statements intended to measure their level of involvement monitoring in terms of inspecting the existing water system sites, securing

the water systems and reporting the functionality status of the water sites. The responses to these items were rated on a 4 point likert scale ranging from 1=strongly disagree to 4=strongly agree. Table 12 presents a summary of the findings concerning respondents' views on the level of community participation in monitoring the piped water supply systems.

Table 12: Respondents' views on community participation in monitoring

Items on community participation in monitoring	N	SA (%)	A (%)	DA (%)	SDA (%)
Participate in activities of inspecting the water system sites	199	22 (11)	62 (31)	81 (41)	34 (17)
Support activities of inspecting the water sites	199	31 (16)	65 (33)	77 (38)	26 (13)
Participate in activities aimed at securing the safety of the water system	199	35 (17)	47 (24)	71 (36)	46 (23)
Support activities aimed at securing the water supply system	199	28 (14)	52 (26)	68 (34)	51 (26)
Report to concerned authorities any mul-functionality in the water supply system	199	30 (15)	44 (22)	58 (29)	67 (34)

Notes: SA=strongly agree, A=agree, DA=disagree, SDA=strongly disagree; Source: Primary data

In order to ease the process of data management and analysis, responses in the form of 'strongly disagree' and 'disagree' were integrated into 'disagree', while responses in the form of 'strongly agree' and 'agree' were integrated into one component 'agree.' The findings in Table 12 show that 115 respondents (58%) disagreed with the statement that they always participate in activities of inspecting the water systems sites. Furthermore, 103 respondents (51%) were unwilling to support activities of inspecting the water sites. When asked whether they were willing to participate in activities aimed at securing the safety of the water systems, 117 respondents (59%) disagreed with this item. Similarly, 119 respondents (60%) reported not willing to support activities aimed at securing water supply systems. Finally, the results in the table show that 125 respondents (63%) were

unwilling to report to concerned authorities when they noticed mul-functionality in the water supply systems. The findings mean that community members' involvement in inspecting water sites, securing safety of the water systems and reporting the mul-functionality status of the water systems was found to be low. Therefore, if community members are less willing to inspect, secure and report functionality status of the water systems, this could lead to poor functionality and working condition of the systems.

Further qualitative data obtained through interviewing key informants revealed that community participation in monitoring was poor. Two major themes emerged out of the qualitative responses including: willingness to inspect existing water supply systems was low because of lack of time, and willingness to report mul-functionality status of the water systems was because of failure by concerned officials to address members' complaints. Under the theme of unwillingness to inspect existing water supply systems due to lack of lack of time, one of the community leaders reported that:

> "We usually mobilize the people to inspect the existing water supply systems, but there responses are usually very poor characterized by few members who turn up. They normally claim they don't have time for such activities; so we miss out on their ideas of how to effectively manage the water systems" **(Respondent 25)**.

Because of the failure by community members to inspect the water systems usually, the community leaders are denied useful ideas from community members that can be used for effectively managing the water systems, thus leading to poor functionality status and working condition of the water systems.

Under the theme of unwillingness to report mul-functionality status of the water systems due to failure of concerned officials to address their issues, one community leader had this to say:

> "Members have been discouraged to report when a water system develops problems because many times when they report, nothing is done and the systems that break-down remain unattended to for a long time" **(Respondent 13)**.

This means that community members' willingness to report mul-functional status of the water system means that the systems that breakdown or develop problems, remain unattended to for a long time, hence, the poor functionality and working condition of the water systems in small towns in Eastern Uganda.

Overall, both the qualitative and quantitative findings showed community participation in monitoring piped water supply systems in small towns in Eastern Uganda was low. Following a descriptive analysis of responses on community participation in monitoring, a correlation was conducted between an average score of items on the level of participation in monitoring and an average score of items on the status of O&M to determine the statistical relationship between the two variables. The correlation test was conducted under the following hypothesis: there is no significant relationship between the level of community participation in monitoring and the current status of O&M of piped water supply systems among households in small towns in Eastern Uganda. The results are summarized in Table 13.

Table 13: Correlation--community participation in monitoring and O&M

Variable		Operation & maintenance	Community participation in monitoring
Operation & maintenance	Pearson's Correlation	1	0.481
	Sig (2-tailed)		0.022
Community participation in monitoring	Pearson's Correlation	0.481	
	Sig (2-tailed)	0.022	1

Source: Primary data

The findings in Table 13 show a Pearson's correlation coefficient of 0.481 and a computed probability value of 0.022, which was less than the predetermined probability value of 0.05. The finding showed that there was a significant positive relationship between community participation in monitoring and O&M of piped water supply systems. That is, the higher the level of community participation in monitoring, the better the O&M of piped water supply systems, the lower the level of community participation in monitoring, the poorer the O&M of piped water supply systems. From the findings, the pre-formulated null hypothesis was rejected and it was concluded that indeed, there was a significant positive relationship between the level of community participation in monitoring and the current status of O&M of piped water supply systems among households in small towns in Eastern Uganda.

But, since the correlation coefficient could not determine by how much a positive change in community participation in monitoring would lead to an improvement in the status of the current O&M of the piped water supply systems, regression analysis was conducted and a coefficient of determination (r^2) was calculated to determine the percentage by which the current status of O&M of the piped water supply systems would improve as a

result of a positive change in the level of community participation in monitoring. The results are presented in Table 14.

Table 14: Regression—community participation in monitoring and O&M

$R = 0.481$, $R^2 = 0.231$, Adjusted $R^2 = 0.229$ $F = 9.356$, Sig. $F = 0.000$					
Variables in the model	**Unsatandardized coefficients**		**Standardized coefficients**	***t***	***ρ*-level**
	β	Std. Error	Beta		
(Constant)	3.609	1.531		2.357	0.064
Community participation in monitoring	0.468	0.302	0.481	1.549	0.022

a. Dependent variable: Operation and maintenance of piped water supply systems

The results in the table indicate a coefficient of determination (r^2) of 0.231. This finding implies that, holding the other factors constant, a positive change in the level of community participation in monitoring in terms of increasing community members' involvement in inspecting, securing and reporting the mul-functionality status of the water systems, would on the average lead to a 23.1% improvement in the current status of O&M of piped water supply systems in the surveyed areas. The *F*-statistic (9.356) was significant at the 5% level, which means that overall, community participation in monitoring was found to be a significant predictor of operation and maintenance of piped water supply systems in small towns in Eastern Uganda.

CHAPTER FIVE

SUMMARY, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the summary of the findings, discussion of the study findings, conclusions and recommendations from the study. The contributions of the study, areas for future research and study limitations are also highlighted.

5.1 Summary of the Study Findings

The following sub-sections present a summary of the findings corresponding to each objective.

5.1.1 Level of community participation in planning and the O&M of piped water supply systems in small towns in Eastern Uganda

The first objective sought to find out the relationship between level of community participation in planning and the operations and maintenance of piped water supply systems among households in small towns in Eastern Uganda. As indicated in Table 6, the level of community participation in planning was found to be low, characterized by low community members' involvement in water-related meetings. The qualitative findings also revealed that community members' involvement in planning meeting related the water supply systems was low because of the tendency to disregard community members' ideas in final decisions, preferences and lack of adequate information. When data in Table 6 about the low level of community participation in planning was correlated with data in Table 5 about the low status of O&M of piped water supply systems, the results in Table 7 showed that there was a significant positive relationship between the level of community participation in planning and the O&M of

piped water supply systems in small towns in Eastern Uganda (r = 0.667, p = 0.035). It was also found through regression analysis that the coefficient of determination (r^2) was 0.444.

5.1.2 Level of community participation in implementation and O&M of piped water supply systems in small towns in Eastern Uganda

The second objective sought to establish the relationship between level of community participation in implementation and the operations and maintenance of piped water supply systems in small towns in Eastern Uganda. From the results indicated in Table 9, it was clear that the level of community participation in implementation was low evidenced by low community members' willingness to contribute money, materials, labor and time into executing plans related to the piped water systems. The qualitative data also revealed that community members' willingness to contribute resources needed in constructing and looking after the water supply systems was low because of perceptions of corruption, lack of compensation and poverty. After correlating data in Table 9 about the level of community participation in planning and data in Table 5 about the status of O&M of piped water supply systems, the results presented in Table 10 showed that there was a significant positive relationship between the level of community participation in implementation and the status of operation and maintenance of piped water supply systems in small towns in Eastern Uganda (r = 0.592, p = 0.018). It was also found through regression analysis that the coefficient of determination (r^2) was 0.350.

5.1.3 Level of community participation in monitoring and O&M of piped water supply systems in small towns in Eastern Uganda

The final objective sought to determine the relationship between level of community participation in monitoring and the operations and maintenance of piped water supply systems in small towns in Eastern Uganda. The results presented in Table 12 showed that the level of community participation in monitoring water supply systems was evidenced by low level of community members' involvement in water site inspection, water site security and reporting mul-functional status of the water systems. The qualitative findings also showed that community participation in inspecting water systems and reporting mul-functionality status of the water systems was low and attributed to lack of time and failure by concerned officials to address the issues reported. When the data in Table 12 about the low level of community participation in monitoring was correlated with data in Table 5 about the low status of O&M of the water systems, the results in Table 13 showed that there was a significant positive relationship between community participation in monitoring and O&M of piped water supply systems in small towns in Eastern Uganda (r = 0.481, p = 0.022). In addition, through regression analysis, the coefficient of determination (r^2) was 0.231.

5.2 Discussion of the Study Findings

The following subsections present the discussion of the findings of this study following an objective-by-objective approach.

5.2.1 Level of community participation in planning and O&M of piped water supply systems in small towns in Eastern Uganda

The first research question of this research sought to establish the relationship between level of community participation in planning and the O&M of piped water supply systems among households in small towns in Eastern Uganda. Overall, the results showed that there was a significant positive relationship between level of community participation in planning and the O&M of the piped water supply systems.

The finding supports earlier findings by Stajkovic & Luthans (2003) found that involving community members in problem solving processes increased chances of success of interventions aimed at solving communities' education needs. The finding is also consistent with the study by Bijleveld et al. (2009) who attributed the failure of community-based environment interventions in remote areas of Ghana to inadequate involvement of community members in analysis community environment needs in their areas. Furthermore, Sekanyonyi and Anderson (2001) found that soil fertility reclamation interventions in Luwero District were successful partly because of effective pre-involvement of community members in problem analysis related to soil fertility. Owor (2010) found that failure of community water resources in Arua District was partly attributed to failure of members to act responsibly by taking care of the resources that benefit them as a community. Okeny (2004) showed that participation in planning lead to success of DANIDA community-based water project in Rakai District, while Nakaseeta (2002) found that participation in planning and sustainability of the water systems was one of the factors influencing sustainability of community-based water systems in

Kayunga District. Thus, the findings of the current study in regard to community participation in planning are consistent earlier empirical studies.

The finding of a positive relationship between community participation in planning and operation and maintenance of the piped water supply systems is consistent with the resource mobilization theory as developed by McCarthy and Zald (1973). The theory postulates that communities can only successfully pursue their community-related goals through being actively and collectively involved in all activities and processes geared towards achievement of those goals (Schouten & Moriarty, 2003). This study found that community involvement in planning for piped water supply systems was low, and this could partly explain the poor operation and maintenance of the water supply systems in terms of their functionality and working condition. Thus, the Resource Mobilization theory ably explains the finding of a positive relationship between community participation in planning and the operation and maintenance of piped water supply systems among households in small towns in Eastern Uganda.

According to Kernan & Hanges (2002), one of the hallmarks of successful community participation in planning is listening to and considering community members' views in the final decision-making process as this raises their feelings of attachment to and ownership of planned community projects. One of the themes that emerged from data generated through face-to-face interviews with key informants was that community members' involvement in planning meeting related to the water supply systems was low because members' ideas tended to be disregarded in final decision-making. A such, they

felt less attachment to and ownership of the water projects in their areas, which resulted into offering less care for the water systems. The researcher believes this partly explains why the level of community participation in planning was low and why this was positively related to the poor current status of operation and maintenance of piped water supply systems in small towns in Eastern Uganda. Therefore, increasing community members' involvement in water-related meetings by listening to and considering their views in final decisions related to water matters, would raise their feelings of attachment to and ownership of the water projects, which in turn, would raise their willingness to care for the projects; thus, improving the functionality status and working condition of the piped water supply systems in the surveyed area.

Howard-Grabman (2000) contends that one of the requirements for successful community participation is taking into consideration the preferences of community members. One of the themes that emerged from the qualitative data revealed that community members' preferences in water system issues were disregarded. For instance, it was found that community members' preferences for a yard tap in favor of a borehole and the preferred location of a borehole in an area close to people were ignored. As a result, managing and securing the boreholes became difficult, which contributed to breakdown and vandalism of borehole components. The researcher believes that ignoring community members' preferences at the level of planning partly explains why the low level of community participation in planning was positively related to the poor status of functionality and working conditions of piped water supply systems in the surveyed areas. Therefore, involving community members in planning by considering their

preferences would improve the O&M of piped water supply systems in small towns in Eastern Uganda.

Folscher (2004) noted that it is important, at the planning stage, that members are equipped with all the necessary information required in contributing ideas which can appropriately inform decisions that positively affect the community projects and the members' welfare derived from such projects. One of the themes that emerged from the qualitative data on community participation in planning was that members were not actively involved in planning meetings because they lacked adequate information concerning the planned water projects. This often led to adoption of ill-informed and inappropriate water system-related decisions, which negatively affected the functionality and working condition of the water systems. The researchers believes that this partly explains why the low level of community participation in planning was positively related to the poor status of O&M of piped water supply systems in small town s in Eastern Uganda. Therefore, increasing community members' involvement in planning meetings by equipping them with all the necessary information would lead to informed and appropriate decisions that positively affect the status of O&M of the water systems.

However, the findings of this study were largely based on a cross-sectional survey design which could not establish a cause-effect relationship between the level community participation in planning and the current status of O&M of piped water supply systems. In future a study based on longitudinal or experiment designs should be conducted to

establish whether the level of community participation in planning is the cause of the current status of O&M of piped water supply systems in small towns in Eastern Uganda.

5.2.2 Level of community participation in implementation and operation & maintenance of piped water supply systems in small towns in Eastern Uganda

The second research question of this study sought to establish the relationship between level of community participation in implementation and the current status of operation and maintenance of piped water systems among households in small towns in Eastern Uganda. The results in Table 9 showed that there was a significant positive relationship between community participation in implementation and the operation and maintenance of piped water supply systems. For community leaders and private operators of the water systems, who are charged with community mobilization responsibilities, this finding implies that encouraging community members' to contribute resources by establishing proper accountability mechanisms, economically empowering members, and compensating members' for sacrificing their resources would enhance community participation in implementation, and in turn improve the functionality status and working condition of the water systems in the surveyed areas.

The findings of this study in this regard are in agreement with earlier findings by Samuel & Chin (2009), Pate & Martinez (2000), Banakus & Angel (2003), and Choo & Boze (2007) who also found that community participation in implementation of community-based water projects is important for their success in terms of ensuring that they function as expected and continue existing in good working condition. Furthermore, the findings

of this study are in line with earlier findings by Kasekende (2005) who found that willingness of community members to contribute resources such as land and construction materials was one of the major factors explaining successful implementation of community-based water systems in Kasanda Sub County in Mubende District and Okello (2006) noted that encouraging participation of community members in the implementation of community activities guarantees the sustainability of community activities. However, they contradict findings by Markova and Ford (2011) who found no significant relationship between public participation in implementation and maintenance of local-based water systems.

The finding of a positive relationship between community participation in implementation and operation and maintenance of the piped water supply systems can be explained by the resource mobilization theory advanced by McCarthy and Zald (1973). The theory presupposes that communities can only successfully pursue their community-related goals through being actively and collectively involved in all activities and processes geared towards achievement of those goals (Schouten & Moriarty, 2003). It was found that community involvement in implementation of piped water supply systems was generally low. This could partly explain the poor operation and maintenance of the water supply systems in terms of their functionality and working condition in small towns. Thus, the finding of a significant positive relationship between community participation in planning and operation and maintenance of piped water supply systems among households in small towns in Eastern Uganda is ably explained bt the Resource Mobilization theory.

According to Konzil & McGrath (1996), willingness of community members to contribute resources towards development of community-based projects depends on proper utilization of the resources for the right pre-determined cause. During the study, the qualitative findings revealed that some members of the community members were less willing to contribute money required in constructing and caring for the water systems because the people in charge of collecting the money were perceived corrupt and often diverted the money to their personal interests. The researcher believes this partly explains the private operators and caretakers of the water system often lack resources to repair the systems when they breakdown. Therefore, establishing proper accountability mechanisms for collected money would increase community members' willingness to contribute the necessary money and aid the repair of broken-down water system, hence leading to improved functionality status and working condition of the water systems.

Also, Banakus and Angel (2003) contend that one of the challenges facing implementation of community-based initiatives is the voluntariness embedded in them, where people have to engage in community-based activities without being paid. The authors argue that because people have various needs which can only be satisfied through incomes generated by investing their time in income-generating activities, it is very difficult for people to spare time for community-based activities, which can lead to failure of such activities. The qualitative findings of this study revealed that community members were less willing to spare time and other resources for community-based water-related activities because they were not compensated, yet they can use that time to generate income needed in solving there other more important needs. This partly explains

why water systems in the areas often breakdown because of community members do not spare time to look after water system areas. Therefore, establishing allowances for attending activities related to water supply systems may increase community members' willingness to contribute their time, which in turn, will improve the O&M of the water systems in the surveyed areas.

Community participation is also premised on the assumptions members have resources which may be required in supporting community-based initiatives such that they would choose to sacrifice them when needed (Choo & Boze, 2007). One of the themes that emerged from the qualitative data collected was members were unwilling to contribute resources required in constructing and looking after water systems because they were poor or lacked such resources. As a result, the water systems that broke-down often remained unrepaired for long periods of time, hence the poor functional status of some of the water systems in the surveyed areas. There researcher believes that poverty among members partly explains the low level of community participation in implementation, which turn is positively related to the current poor status of O&M of the piped water supply systems. Therefore, economically empowering community members would increase their willingness to contribute resources, which would in turn, improve the functional status and working condition of the water systems in the surveyed areas.

However, similar to findings in section 5.2.1, the findings of this study were largely based on a cross-sectional survey design which could not establish a cause-effect relationship between the level community participation in implementation and the current status of O&M of piped water supply systems. In future a study based on longitudinal or

experiment designs should be conducted to establish whether the level of community participation in implementation is the cause of the current status of O&M of piped water supply systems in small towns in Eastern Uganda.

5.2.3 Level of community participation in monitoring and operation & maintenance of piped water supply systems in small towns in Eastern Uganda

The final research question of this study sought to determine the relationship between community participation in monitoring and the operation and maintenance of piped water systems among households in small towns in Eastern Uganda. The results in Tables 13 showed a significant positive relationship between community participation in monitoring and the operation and maintenance of piped water supply systems. This implies that designating specific time for inspection and addressing mul-functionality issues reported by members, would enhance community participation in monitoring and, in turn, improve the functional status and working condition of piped water supply systems in the surveyed areas.

These findings suggest in agreement with earlier findings by Nelson (2003), Johnson (2000), Sartin (2003), Bruce & Pedro (1999), Jordan & Evans (2005), Adams et al (1998), and Heathfield (2008) who also found positive links between community participation in monitoring and success of community-based project in terms of optimal functionality. The findings are also consistent with findings by Musenze and Mwebaze (2003) who found that collapse of community-based buildings in Lira District was partly attributed to weaknesses in community monitoring and Sekajo (2006) who found that

community-based water projects in Kalangala District were failing because of lack of involvement of community members in monitoring the projects.

The finding of a positive relationship between community participation in monitoring and operation and maintenance of the piped water supply systems is in agreement with McCarthy and Zald's (1973) resource mobilization theory. The theory asserts that communities can successfully pursue their community-related goals only if they are actively and collectively involved in all activities and processes geared towards achievement of those goals (Schouten & Moriarty, 2003). Through this study, it was found that community involvement in monitoring piped water supply systems was low, and this could partly explain why there was poor operation and maintenance of the water supply systems in terms of their functionality and working condition. Thus, the Resource Mobilization theory ably explains the finding of a positive relationship between community participation in monitoring and the operation and maintenance of piped water supply systems among households in small towns in Eastern Uganda.

According to Bruce and Pedro (1999), community participation succeeds in community-based programs where members agree on time schedules for engaging in community-based initiatives. This study established through qualitative results that community members were unwilling to participate in inspecting of the existing water systems because they claimed the lacked time to do so. Thus, the researcher believes that the low community participation in monitoring that was positively related to the current poor status of O&M of the water supply systems can be explained by members' claim of lack

of time, as this means that community is denied off ideas of how to effectively manage the water systems. Such ideas are generated through community members collectively agreeing to inspect the water systems. Therefore, this means that designating agreeable specific times/days for inspecting the water systems would enhance community participation in monitoring, which in turn, would improve the functional status and working condition of the water systems.

Sartin (2003) also argued that in management of community-based initiatives, it is not enough to allow community members to contribute ideas, but much more, it is important to address any ideas that are raised by members. This makes members feel that their ideas are respected and it can drive the spirit of participation, leading to various community gains. The results of qualitative analysis revealed that community members were less willing to report mul-functionality status of the water systems because previously their reports had been ignored and nothing was done to rectify the mul-functioning water systems. Because of this, the mul-functioning water systems remain unattended to for a long time, hence, poor O&M of the systems. It is strongly believed that the low level of community participation in implementation which was positively related to the current poor status of O&M of the water systems can partly be explained by failure of concerned officials to address the mul-functionality reports raised by community members. Therefore, ensuring that the mul-functionality reports raised by community members are effectively addressed by concerned officials would enhance community participation in monitoring and in turn, improve the functionality status and working condition of piped water supply systems in the surveyed areas.

5.3 Conclusions from the Study

The conclusions from this study are derived from the discussion of the study findings and they are presented systematically following the research questions.

5.3.1 Level of community participation in planning and operation and maintenance of piped water supply systems in small towns in Eastern Uganda

The first research question of the study stated as follows: what is the relationship between community participation in planning and the operation and maintenance of piped water supply systems in small towns in Eastern Uganda? Overall, there was a significant positive relationship between community participation in planning and the operation and maintenance of piped water supply systems. Therefore, the lesson learned was that increasing community participation in planning would improve the operation and maintenance of piped water supply systems in terms of their functionality and working condition.

5.3.2 Level of community participation in implementation and operation and maintenance of piped water supply systems in small towns in Eastern Uganda

The second research question of the study stated as follows: what is the relationship between community participation in implementation and the operation and maintenance of piped water supply systems in small towns in Eastern Uganda? Overall, there was a significant positive relationship between community participation in implementation and the operation and maintenance of piped water supply systems. Therefore, the conclusion was that increasing community participation in implementation would improve the

operation and maintenance of piped water supply systems in terms of their functionality and working condition.

5.3.3 Level of community participation in monitoring and operation and maintenance of piped water supply systems in small towns in Eastern Uganda

The final research question of the study stated as follows: what is the relationship between community participation in monitoring and the operation and maintenance of piped water supply systems in small towns in Eastern Uganda? Overall, there was a significant positive relationship between community participation in monitoring and the operation and maintenance of piped water supply systems. The conclusion from this study was that increasing community participation in monitoring would improve the operation and maintenance of piped water supply systems in terms of their functionality and working condition.

5.4 Recommendations from the Study

The recommendations of this study are derived from the conclusions drawn from the research findings, and they are specific to the study objective.

5.4.1 Level of community participation in planning and operation and maintenance of piped water supply systems in small towns in Eastern Uganda

Private operators, water management committee members and local community leaders can increase the level of community members' participation in planning by enhancing community members' involvement in planning meetings related to the water supply systems. Community members' involvement in planning meeting related to water

systems can be enhanced by listening and considering their views related to the water systems, respecting their preferences related to the water systems and equipping them with adequate information necessary for making appropriate and informed decisions related to the water systems. In this way, members will feel that their views are valued. As a result, their sense of attachment to, ownership of and care for the water facilities will increase; leading to increase in the functionality and working condition (O&M) of piped water supply systems in small town in Eastern Uganda.

5.4.2 Level of community participation in implementation and operation & maintenance of piped water supply systems in small towns in Eastern Uganda

Local authorities, water management committee members and private operators of the water systems can enhance community participation in implementation by establishing proper accountability mechanisms for collected resources, economically empowering community members, and compensating members for resources sacrificed towards implementing community water projects. This will in turn, increase resources available for constructing new water systems, care for existing water systems, and repair of broken-down water systems, hence, improving the functionality status and working condition of the water systems in the surveyed areas.

5.4.3 Level of community participation in monitoring and operation and maintenance of piped water supply systems in small towns in Eastern Uganda

Private operators, water management committee members and local community leaders can enhance the level of community members' participation in monitoring by designating

specific agreeable times/days for inspecting water systems and effectively addressing mul-functionality issues raised by community members. As a result, their feelings of being valued will increase; leading to increase in the functionality and working condition (O&M) of piped water supply systems in small town in Eastern Uganda.

5.5 Contributions of the Study

Empirical information related the effect of community participation on O&M of piped water supply systems in small towns in Eastern Uganda is scarce. Thus, this study has added value to the existing body of knowledge relating community participation to operation and maintenance of community-based water supply systems.

Another contribution of this study comes from the theory that was applied with reference to the literature referred to in chapter three. This finding of statistically significant results between community participation constructs (planning, implementation and monitoring) and O&M of piped water supply systems in small towns in Eastern Uganda has been explained by the theory adopted, which validates the use of the theory in matters related to community participation and O&M of community-based water systems.

In chapter two of the report, the literature reviewed showed that the effect of community participation on water resource management or operation and maintenance of water supply systems revealed mixed results; some studies showed a positive significant relationship between community participation and O&M, while in other studies, the relationship was not significant. Therefore, the consistence between the findings of this study and some of the studies reviewed in chapter two of literature review has added

clarity on the relationship between community participation and operation and maintenance of community-based water supply systems.

Finally, the purpose of this study was to examine the level of community participation and how it is related to the current O&M of piped water supply systems in small towns in Eastern Uganda. The current study has generated recommendations which can be used to enhance community participation so as to the operation and maintenance of community-based piped water supply systems in the surveyed areas.

5.6 Areas for Further Research

- The findings of this study were largely based on a cross-sectional survey design which could not establish a cause-effect relationship between the level community participation and the current status of O&M of piped water supply systems.
- In future a study based on longitudinal or experiment designs should be conducted to establish whether the level of community participation is the cause of the current status of O&M of piped water supply systems in small towns in Eastern Uganda as this may reveal different results.

5.7 Limitations of the Study

The study had the following limitations:

Much of findings of this study were based on primary information provided by the respondents, which are subject to the potential bias and prejudice of respondents. However, this was overcome by ensuring that as mush as possible, the study relied on secondary data related to the subject under investigation in addition to the primary data.

This study was cross-sectional in nature and could therefore not determine the cause-effect relationship between community participation and operation and maintenance of piped water supply systems in small towns in Eastern Uganda. However, through the use of a mixture of quantitative and qualitative approaches, the cause-effect relationship could be partially established.

Obtaining data for this study was difficult as most respondents complained that numerous water-related studies had been conducted previously, but they had not witnessed changes to the current waters supply situation. However, it took the effort of local community leaders and the researchers' ability to explain the purpose and potential benefits of the study for respondents to finally accept participating in the study.

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APPENDICES

Appendix 1: Sample Questionnaire

Dear Participant,

This questionnaire is designed to study the effect of community participation on operation and maintenance services of piped water supply systems in small towns in Eastern Uganda. The information collected will help to analyse operation and maintenance services in small town water supply systems. The results of the study will contribute to development of strategies for improving operation and maintenance of water supply systems in small towns of Uganda. You have been identified as a key stakeholder in the town water supply system with a good understanding of the operation of the system. I kindly request you to respond to the questions frankly and honestly. There is no need to disclose your name.

Your responses will be kept strictly confidential. Only the research team will have access to the information you give. Please spare about 15 minutes of your time to respond to the questions in the questionnaire according to the provided instructions. A summary of the results will be sent to you after the data are analyzed.

Thank you very much for your time and cooperation.

Sunday Emmanuel

Researcher

SECTION A: SOCIO-DEMOGRAPHIC INFORMATION

Please tick the information applicable to you.

No	QUESTION	ANSWER				
		1	**2**	**3**	**4**	**5**
1	What is your age in years?	Under 20	20-35	36-50	51-65	Over 65
2	What is your gender?	Female	Male			
3	What is your highest completed level of education?	None	Primary	Ordinary level	Advanced Level	College & above
4	What is your occupation?	Peasant	Commercial Farmer	Business	Salary Earner	Casual Labourer

On a scale of 1 – 5 (1-Strongly Disagree, 2-Disagree, 3- Agree, 4-Strongly Agree); please tick your opinion on the following statements in the various categories as outlined in the table.

		1	2		3	4
SECTION B: OPERATION & MAINTAINANCE OF WATER SYSTEMS						
5	Water is always available when needed					
6	The water system generates sufficient water for users					
7	The quality of the water is always good					
8	The water supply system components are always in good condition					
9	The water pressure is always good					
10	The water system is routinely examined to detect existing faulty conditions					
11	The water system facilities are always cleaned					

12	Minor break downs in the water system are immediately repaired (within 24 hours)					
13	Major break downs in the water systems are promptly addressed (within 3 days)					
SECTION C: COMMUNITY PARTICIPATION IN PLANNING						
14	Community members attend meetings to discuss water supply matters					
15	Community members decide key issues on matters pertaining the water supply systems					
16	Members are involved in assessing their water needs					
17	Community members are involved in identifying the appropriate piped water system technology					
18	Community members are involved in identifying the site of the water system					
19	Community members are involved in identifying the water provision action plans					
SECTION D: COMMUNITY PARTICIPATION IN IMPLEMENTATION						
20	I am always willing to contribute money for use in piped water facility construction					
21	I am always willing to contribute construction materials needed in constructing the piped water facilities					
22	I am always willing to contribute construction labor needed in constructing the piped water facilities					
23	I am always willing to spare time for the piped water activities and programs					
SECTION E: COMMUNITY PARTICIPATION IN MONITORING						
24	I always participate in activities aimed at inspecting the water supply system site					
25	I always participate in activities aimed at securing the water supply system site					

26	I am always willing to support any activity involving inspection of the water system sites					
27	I am always willing to support any activity aimed at securing the water system sites					
28	I always report to the concerned authorities whenever I notice any mul-functionality in the piped water supply systems					

Thanking you for your cooperation

Appendix 2: Sample Interview Guide

SECTION A: RESPONDENTS SOCIO-DEMOGRAPHIC BACKGROUND

Please put a tick in a box with information appropriate to the respondent.

No	QUESTION	ANSWER				
		1	**2**	**3**	**4**	**5**
1	What is your age in years?	Under 20	20-35	36-50	51-65	Over 65
2	What is your gender?	Female	Male			
3	What is your highest completed level of education?	None	Primary	Ordinary level	Advanced Level	College & above
4	What is your occupation?	Peasant	Commercial Farmer	Business	Salary Earner	Casual Labourer

SECTION B: OPERATION & MAINTAINANCE OF PIPED WATER SYSTEMS

5. What is your assessment of the status of operation and maintenance of the existing piped water supply systems in you area?

6. Are you satisfied with the state of operation and maintenance of the existing piped water supply systems in your area?

6. If yes, explain more. If no, explain why.

7. What recommendations would you make for improving the current operation and maintenance of the existing piped water supply systems in your area?

SECTION C: COMMUNITY PARTICIPATION IN PLANNING

8. What is your current assessment of the level of community participation in planning for piped water supply systems in this area?

9. Are you satisfied with the level of community involvement in planning for piped water supply systems in this area?

10. If yes, explain more. If no, explain why.

11. Do you think the level of community participation in planning has an influence on the operation and maintenance of existing piped water supply systems in this area?

12. If yes, explain more. If no, explain why.

SECTION D: COMMUNITY PARTICIPATION IN IMPLEMENTATION

13. What is your current assessment of the level of community participation in implementation of piped water supply systems in this area?

14. Are you satisfied with the level of community involvement in implementation for piped water supply systems in this area?

15. If yes, explain more. If no, explain why.

16. Do you think the level of community participation in implementation has an influence on the operation and maintenance of existing piped water supply systems in this area?

17. If yes, explain more. If no, explain why.

SECTION E: COMMUNITY PARTICIPATION IN MONITORING

18. What is your current assessment of the level of community participation in monitoring of piped water supply systems in this area?

19. Are you satisfied with the level of community involvement in monitoring for piped water supply systems in this area?

20. If yes, explain more. If no, explain why.

21. Do you think the level of community participation in monitoring has an influence on the operation and maintenance of existing piped water supply systems in this area?

22. If yes, explain more. If no, explain why.

Appendix 3: Sample Observation Checklist

State of Operation and Maintenance of Piped Water Supply Systems

On a scale of 1 – 5 (Very bad to Very Good), please tick the observed state of operation and maintenance of piped water supply systems in small towns as indicated the table below.

Infrastructure	**Components**	**State of infrastructure**				
		Very Good (5)	Good (4)	Fair (3)	Bad (2)	Very bad (1)
Water source	Fence					
	Pipes and fittings					
	Protection area					
	General cleanliness					
Reservoir tank	Pipes and fittings					
	Structural fitness					
	General cleanliness					
Kiosks/Water points	Pipes and fittings					
	Structural fitness					