SUSTAINABILITY OF COMMUNITY-BASED DEVELOPMENT PROJECTS IN TANZANIA: A CASE OF DRILLED WELLS PROJECTS IN KONDOA AND CHAMWINO DISTRICTS OF DODOMA REGION

JUDICATE NAFTAL WANGAEL MWANGA

A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY OF SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA.

2018

ABSTRACT

Despite institutional and policy reforms to enhance sustainability of drilled wells projects in Dodoma Region, the sustainability of those projects in the region remains a major challenge. Therefore, the research was done with the general objective to examine sustainability of community-based drilled wells projects in two districts of Dodoma Region Tanzania. The specific objectives were to: determine factors affecting sustainability of community-based drilled wells projects initiative process, assess the extent of stakeholders' participation in different stages of selected drilled wells projects, and determine social, economic and environmental factors influencing the sustainability of selected community-based drilled wells projects. One functional and one non-functinal drilled wells projects were puposively selected from Chanwino and Kondoa Districts based on functionality. Systematic sampling was used to select the sample of households. A cross-sectional research design was adopted involving eight focus group discussions and 13 key informant interviews. A structured questionnaire was administered to a sample of 400 household heads. Quantitative data were subjected to descriptive analysis, while non-parametric tests were used to test for association among variables. The results showed that the projects were initiated by external actors in a top-down approach and later on handed over to communities without sufficient social preparation. There was no evidence of full participation key stakeholders in the project cycle especially in decision making. Social factors were found to influence sustainability of drilled wells projects than economic and environmental factors. In view of the findings, it is concluded that during initiation process, important steps were neglected. Handing over was done without appropriate exit strategies. Hence, it is recommended to balance between top-down and bottom-up interventions. Moreover, LGAs should establish collaborative relationship with the private sector and local communities to sustain drilled wells projects.

DECLARATION

I, JUDICATE NAFTAL WANGAEL MWANGA, do hereby declare to the Senate of Sokoine University of Agriculture that this thesis is my own original work done within the period of registration and that it has neither been submitted nor concurrently being submitted for degree award in any other institution.

_____ _____

Judicate Naftal Wangael Mwanga Date

(PhD Candidate)

The above declaration is confirmed by;

_____ _____

Prof. Raphael M. Wambura Date

(Supervisor)

_____ _____

Prof. Carolyne I. Nombo Date

(Supervisor)

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ACKNOWLEDGEMENTS

This thesis is by no means a one man show, but rather an outcome of efforts by several individuals and organisations. In the foremost place, I would like to express my whole-hearted gratitudes to my employer, the Local Governement Training Institute (LGTI) for availing this rare opportunity and financial support for me to undertake a PhD study.I wish to thank my supervisors, Professor Raphael M. Wambura and Professor Carolyne I. Nombo both from the Institute of Continuing Education (ICE), Sokoine Universtiy of Agriculture for their professional guidance. Their ideas were of immence importance to all those who are to be inspired by reading materials contained in this thesis.

I wish to recognize, in a special way, the contribution by members of staff at the College of CSSH, particularly at the Department of Development Studies (DDS) where I was registered for their remarkable generosity and cooperation. Critiques and ideas from DDS academic staff during the early stages of concept note, proposal development and seminar presentations were very useful in accomplishment of this work. I wish to appreciate the noble services offered by staff at Sokoine University of Agricuture Laboratory for Interdisciplinary Statistic Analysis (SUALISA) and Sokoine National Agricuture SUA Library. Without their logistical support, it would have been difficult to accomplish this task.

In many ways, my greatest debt is to the respondents and entire local society of Bereko, Kingale, Haneti and Membe Villages who unreservedly shared their precious time, knowledge and experience on community-based development projects. I appreciate the information sharing from Private Operators (POs), Village Water Committees (VWCs), Ward Executive Officers (WEOs), Village Executive Officers (VEOs), Village

Chairpersons- retired and those who are still serving in the study area. I am highly indebted to the Water Advisors based at RS-Dodoma, DED for Chamwino, DC and Kondoa DC; Management of Lay Volunteers International Association (LVIA), *Maji na Maendeleo Dodoma* meaning Water and Development in Dodoma (MAMADO), Drilling and Dam Construction Agency (DDCA) and Water Laboratory Dodoma.

Data in this study were collected with support of two enumerators namely: Ms. Emmaculata Njau and Ms. Benedicta Kimbe who played the role of enumerators. Their trustworth, listening skills, consistence and patience were important elements in reliability of the data used in this study. Printing and typesseting were professionally done by Henry Chessam Mgao for which he is highly acknowledged. My fellow candidates Mr. Ringo Justin, Ringo Dominick, Mjema Mweta, Masood Said, Mapunda Matei, Msomba Solomon Ms. Martha Laizer were very supportive during difficult times of PhD endurance.

To my family, specifically my lovely wife Dr. Okuli Swai for her critical review of the drafts, moral and emotional support during hectic periods; my daughters Praise, and Helper for their endurance during my long absence. Since it is not possible to mention all individuals who contributed in this piece of work, collectively I kindly request them to accept my deepest gratitudes.

Lastly,it is a disclaimer; while the materials, ideas, inferences, synthesis, conclusions and recomendations drawn in this thesis are not necessarily reflecting opinions of any of the organisations which supported this research, errors and ommisions remain the responsibility of the Author alone.

DEDICATION

To my maternal Grandmother, the late Mrs. Apaisarya Malewi (1898-2005), my heroine and the greatest person I will ever know. To my lovely sister, the late Eliaisa Naftal Mwanga (1960-65), who could not live longer to enjoy the academic world.

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LIST OF ABBREVIATIONS AND ACRONYMS

AFD	L'*Agence française de développement* (French Development Agency)
ANT	Actor Network Theory
AusAID	Australian Agency for International Development
BHN	Basic Human Needs Theory
CA	Content Analysis
CBDPs	Community-Based Development Projects
CDD	Community Driven Development
CG	Central Government
CM	Community Management
CMHHs	Community Member Household Heads
COWSO	Community-Owned Water Supply Organisations
CIs	Community Initiatives
CIN	Community Information Network
CP	Community Participation
CSSH	College of Social Sciences and Humanities
DADPs	District Agricultural Development Projects
DAS	District Administrative Secretary
DC	District Commissioner
D by D	Decentralisation by Devolution
DDCA	Drilling and Dam Construction Agency
DDS	Department of Development Studies
DED	District Executive Director
DFID	Department of International Development

DGs	Development Goals
DWPs	Drilled Wells Projects
ELCT	Evangelical Lutheran Council of Tanzania
EU	European Union
EWURA	Energy and Water Utilities Regulatory Authority
FCMHH	Female Community Members Household head
FDWs	Functional Drilled Wells
FGDs	Focus Group Discussions
FHHs	Female Headed Households
FCMHHs	Female Community members Households heads
FYDP-II	Five-year Development Plan phase two
GIZ	(*Deutsche Gesellschaft für Technische Zusammenarbeit*) or German International Cooperation)
GWSP	Global Water System Project
HBS	Household Budget Survey
HHD	Household Head
IADC	International Association of Drilling Contractors
ICE	Institute of Continuing Education
IFAD	International Fund for Agricultural Development
JICA	Japan International Cooperation Agency
KASE	Knowledge, Attitude, Skills and Experience
KIs	Key Informants
KIIs	Key Informants Interviews
IGWA	Idaho Ground Water Association
LDCs	Least Developed Countries

LGAs	Local Government Authorities
LGDG	Local Government Development Grant
LGTI	Local Government Training Institute
LLG	Lower levels of Local Government
LVIA	Lay Volunteers International Association
MAFSC	Ministry of Agriculture, Food Security and Cooperatives
MAMADO	*Maji na Maendeleo Dodoma* (Water and Development in Dodoma)
MARD	Masters of Arts in Rural Development
MCC	Millennium Challenge Corporation
MCMHHs	Male community members' household heads
MDAs	Ministry, Departments and Agencies
MDGs	Millennium Development Goals
M&E	Monitoring and Evaluation
MHHs	Male Headed Households
MKUKUTA	*Mkakati wa Taifa wa Kukuza Uchumi na Kupunguza Umaskini Tanzania* (National Strategy for Growth and Reduction of Poverty)
MoWLD	Ministry of Water and Livestock Development
NAWAPO	National Water Policy
NBS	National Bureau of Statistics
NEP	National Environmental Policy
NFDW	Non-functional Drilled Well
NGOs	Non-Governmental Organisations
NSGRP	National Strategy for Growth and Reduction of Poverty
O&OD	Opportunities and Obstacles to Development
OJT	On the Job Training

O & M	Operation and Maintenance
PEST	Political, Economic, Social and Technlogical
PMI	Project Management Institute
POs	Private Operators
PPP	Public-Private-Partnership
PRA	Participatory Rural Appraisal
RAS	Regional Administrative Secretary
RON	Resources Organisations and Norms
RONIC	Resources, Organisations, Norms, Institutional linkages and Capability building
SACCOS	Savings and Credit Cooperative Societies
SAP	Structural Adjustment Programme
SCBD	Sustainability of Community-based Development
SDGs	Sustainable Development Goals
SNAL	Sokoine National Agricultural Library
SUA	Sokoine University of Agriculture
SOC	Self-organising Capability
SUALISA	Sokoine University of Agricuture Laboratory for Interdiscplinary Statistical Analysis
SPECE	Social, Political, Economic, Cultural and Environmental
SPSS	Statistical Package for Social Sciences
SWOT	Strength, Weakness, Opportunity and Threat
TZS	Tanzanian Shillings
UK	United Kingdom
UN	United Nations

UNCED	United Nations Conference on Environment and Development
URT	United Republic of Tanzania
USA	United States of America
USAID	United States Agency for International Development
USD	United States Dollar
VEO	Village Executive Officer
VPAs	Village Pump Attendants
VWCs	Village Water Committees
WAMMA	Water Aid, Ministry of Water (*Maji)*, Ministry of Community Development (*Maendeleo*) and Ministry of Health (*Afya)*, an integrated programme
WATSAN	Water and Sanitation
WCED	World Commission on Environment and Development
WEO	Ward Executive Officer
WPs	Water Points
WSDP	Water Sector Development Programme
WOPATA	Women and Poverty Alleviation in Tanzania
WPM	Water Points Mapping
WUA	Water Users Association
WSSD	World Summit on Sustainable Development
WHO	World Health Organisation
WUC	Water User Committee

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

There has been a growing criticism of community development strategies followed by minor adjustments since the 1960s (Shao, 2004). These community development strategies have seen progress primarily as series of technical transfers aimed at boosting production and generating wealth (Wiggins, 2000). In practice, conventional projects usually target medium to large-scale "progressive" producers, supporting them with technology and credit in the hope that improvement will gradually extend to more backward strata of the community (Chambers, 2005).

Since early 1970s, there has been re-emergence of interest in the sustainability of community-based development (SCBD) movement of the 1960s, primarily as a result of the attention that is now being directed to the rural poor (Church, 1995). The SCBD approach of the 1970s was directed at the promotion of better living for the whole community, with the active participation and, if possible, the initiative of the community. However, if this initiative was not forthcoming spontaneously, trained community change agents would be engaged for stimulating community initiative (Michener, 1998). These concepts are derived from the experts on SCBD as opposed to the beneficiaries themselves. It can be argued, therefore, that a precise meaningful definition for SCBD would have to spring up from the common ideas and experiences of both the beneficiaries and experts.

At the local level, sustainable community development requires that local economic development support community life, using the local talents and resources of the local community. It further challenges stakeholders to ensure that the distribution of benefits of

development is done in a more transparent manner and equitably (Mongula, 2005; Pretty, 1995).

Sustainable community development is an umbrella concept that attempts to bridge the gap between economic growth and environmental protection while taking into account other issues traditionally associated with development (Shama and Ohama, 2007; Chambers, 2005). On the other hand, Blewitt (2008) described sustainable community development as a strategy by which communities seek economic development approaches that also benefit the local environment and quality of life. It has become an important guide to many communities that have discovered that traditional approaches to planning and development are creating, rather than solving, societal and environmental problems. Where traditional approaches can lead to congestion, sprawl, pollution and resource over consumption, sustainable development offers real lasting solutions that will strengthen their future. Poverty assessment research, for example, has consistently shown that improvements in water services are a core element in most strategies designed to alleviate poverty (Hussain and Giardano, 2004). It was until recently that these water utility projects were considered to be one-time investment by the government and there was little participation from the community. These projects suffered from poor maintenance and disuse. This situation has led to a demand for more community involvement so that the long-term sustainability of such projects is ensured (Carter *et al*., 1999).

Sustainability of water resources has become a topic of discussion in the field of community development around the globe (GWSP, 2012). This is fuelled by increasing water demand for rapidly increasing population and economic development. Water supply development in Tanzania began around the 1930s when the colonial government started to use public funds for the development of water supplies to areas considered to be of prime

interest such as townships, mission stations, large estates and trading centres (Sara and Katz, 1998). After construction, these water supply schemes were managed on a self-supporting basis and all users were required to pay for the water they used. Active government involvement in the construction of rural water supply started in the 1980s.That is, when the government adopted the UN goals for the Water Decade, and mobilised external assistance to prepare regional water master plans and facilitated rapid construction of water supply schemes. According to Taylor (2009), over 90% of piped schemes ceased operating, mainly due to inability to provide the required fuel for pumping and to keep the motors and pumps in operating condition. In addition, most of the hand-pumps on shallow wells stopped operating for the lack of timely maintenance and repair. Thus, the "free water for all" approach did not meet the intended targets. The lessons learned from "free water for all" shows the need to avoid over ambitious programmes when empowering the local community. Empowering local community means building capabilities for local community for self-reliance, therefore systematic medium or long term efforts are required to execute community empowerment activities phase by phase.

According to URT (2010b), Tanzania's population is poorly supplied with water and has inadequate sanitation systems. To improve the situation, the government has laid the foundations for comprehensive reforms by adopting the National Water Policy in 2002, the National Water Sector Development Strategy in 2006 and new water legislation in 2009. It has also set up a national water utility regulatory authority. The Government designed an ambitious Water Development Strategy Initiative in 2002 (URT, 2010b) to promote integrated water resources management. The strategy was geared towards institutional and policy reforms; decentralisation of water and sanitation service delivery to local government authorities (LGAs) in urban areas and to community-owned water supply organisations (COWSOs) in rural areas. The decentralisation of responsibilities for

water and sanitation service provision shifted to LGAs, which provide technical support and policy implementation of water and sanitation service delivery. The National Water Policy of 2002 (URT, 2002) stipulates that communities are responsible for full cost recovery of water projects, which means the recovery of the complete cost of the installation of the system, as well as covering costs for operation and maintenance. Therefore, sustainability is not just reaching the design life of a technology, but about the on-going availability of clean, affordable and accessible water (Boydell, 1999).

The National Water Policy of 2002 (URT, 2002) identifies seven pre-requisites for sustainable rural water supply as: management at the village level; communities owning and managing their schemes; communities achieving full cost recovery for operation and maintenance of the scheme, as well as replacements; availability of spare parts and expertise; the protection of water sources; compatibility of technology and service level with the capacity of the beneficiaries; and the recognition of women as key players. The policy indicates that sustainability of water supply involves both hardware (that is, cost of maintenance of the scheme and replacements; spare parts and compatibility of technology) and software part (that is, management, community ownership of the scheme and expertise). Although various scholars including Haysome (2006), Kaliba and Norman (2004) and Makonda (2003) have conducted research on water projects, none of the past research on water projects in Tanzania has attempted to focus specifically on self-organising capabilities of local communities for sustainable operation and maintenance of drilled wells.

1.2 Problem Statement and Justification

1.2.1 Problem statement

Despite institutional and policy reforms to enhance sustainability of drilled wells projects in Dodoma Region in Tanzania, the sustainability of such wells in the region remains a

major challenge. For example, Water Point Mapping (WPM) surveys conducted in 51 Districts in 2009 (URT, 2014) found that 54% of all public improved water points were functional, meaning that 46% of public improved water points were not functional. Although 46% is not a total failure due to importance of water to community, reasons for not attaining 100% functionality calls for more in-depth inquiry. The same survey found that two years after project completion, a quarter of water schemes were no longer functioning (Taylor, 2009). By 2014, 44.89% of water points (WPs) in Dodoma Region were not functional (URT, 2014). An assessment of underlying causes for the sustainability differences of community water supply projects would be important not only for community-based drilled wells, but also for new community-based projects.

Moreover, little empirical information is known on the software part of community to sustain their development projects for example local mechanism for operation and maintenance, local organisation, local policies and local capabilities (Sharma and Ohama, 2007; Cleaver and Toner, 2006). From theoretical perspective, none of the previous studies has undertaken their analyses in light of endogenous development theory that is felt-need oriented interventions and emphasising on self-reliance (LVIA, 2013; Haysome, 2006; Kaliba and Norman, 2004; Makonda, 2003). Endogenous development theory emphasises community becoming the main actors in solving their problems. Hence it is a useful tool in assessing development process and gauge local self-organising capabilities especially at this time when Tanzania is decentralising the functions of operating and maintaining water projects to local communities. An overarching question is why are some community managed drilled-wells projects not sustainable while others are sustainable? It is unclear as to why some water user groups should be having difficult managing the water supply of such a basic necessity on sustainable basis while others can. These discrepancies as well as persistence of sustainability problems in community based projects called for further studies to generate information on sustainability of community drilled wells

projects, which currently was not well known. The purpose of this study was, therefore, to assess sustainability of community-based drilled wells projects in Dodoma Region, Tanzania.

1.2.2 Justification of the study

Identification of factors influencing the sustainability differences of community-based water supply projects in the study area is important not only for sustainable management of existing projects, but also in establishing new development projects country-wide. Publication of the findings of this study will, therefore, inform policy makers, students, academicians and practitioners engaged in actions to create affordable, sustainable and reliable sources of water in the study area and beyond in the country, for both drinking and use for productive activities. Moreover, the study is in line with the second five-year development plan (FYDP II - 2016/17 - 2020/21) objective 6, which seeks to improve quality of life and human wellbeing, and objective 8, to intensify and strengthen the role of local actors in planning and implementation (URT, 2016). Access to clean, safe water and good sanitation and hygiene practices is essential to promote health and productivity of the population.

1.3 Objectives

1.3.1 Overall objective

To examine sustainability of community-based drilled wells projects in Kondoa and Chamwino districts of Dodoma Region, Tanzania.

1.3.2 Specific objectives

(i) To determine factors affecting sustainability of community-based drilled wells projects initiative process.

(ii) To assess the extent of stakeholders' participation in different stages of selected community-based drilled wells projects.

(iii) To determine social, economic and environmental factors influencing the sustainability of community-based drilled wells projects.

1.4 Research Questions of the Study

The following were the key questions that were answered by this study:

Overarching question for this study was what were the underlying factors for success or failure of sustainable maintenance and operation of drilled wells?

(i) During planning phase, what were the different factors that affected sustainability of selected functional as compared to non-functional community-based drilled wells projects initiative process?

(ii) During implementation phase, how different and to what extent did stakeholders participate in different stages of selected functional as compared to non-functional community-based drilled wells projects?

(iii) After withdraw of donors, what were the social, economic and environmental factors that influenced sustainability of selected functional as compared to non-functional community-based drilled wells?

1.5 Organisation of the Thesis

This thesis adopted the monograph format and is organised in five chapters, namely (i) Introduction covering background information, problem statement and justification; objectives and research questions. (ii) Literature review covering operational definitions of key terms, empirical literature, theoretical and conceptual frameworks. (iii) Methodology comprised of study area, research design, sampling procedures, data collection, processing and analysis as well as limitations of the study. (iv) Results and discussion. (v) Conclusions and recommendations which also provide major contributions of the study and lastly suggestions for further research.

CHAPTER TWO

2.0 LITERATURE REVIEW

This Chapter reviewed literature of other studies in order to provide a theoretical framework, which guided the development of the study model on which analyses of the data for the present study were based. It focuses on operational definition of key concepts, empirical literature which includes community-based development projects, initiative process of community-based projects, factors affecting sustainability of community-based development projects, theoretical framework and conceptual framework.

2.1 Operational Definitions of Key Concepts

2.1.1 Development

So far there is no a completely convincing and acceptable standard definition of development. The World Bank (2016) defined development to encompass the need and the means by which to provide better lives for people in poor countries. It includes not only economic growth, although that is crucial, but also human development providing for clean and safe water, health, nutrition, education, and a clean environment. Amartya (2012) defined development as capability expansion in terms of systematic use of scientific and technical knowledge to meet specific objectives or requirements. Bertil (2001) defined development as an expansion of human freedom. Dudley's (1969) definition of development is widely accepted as it touches the basic hurdles for development. According to Dudley, development occurs with the reduction and elimination of poverty, inequality and unemployment within a growing economy. Borrowing some parts of Dudley's definition in this study, development refers to progressive process of transforming the resources and technology into goods and services

through community-based drilled wells projects for improved livelihoods of the citizens and poverty reduction in the study area.

2.1.2 Sustainability

Scholars have different views on definition of sustainability depending on the scope and different contexts. Some defines sustainability as the continuation of benefits after major assistance from a donor has been completed (AusAID, 2000). Some treat it as the likely continuation of net benefits from a development intervention beyond the phase of external funding support. It also includes an assessment of the likelihood that actual and anticipated results will be resilient to risks beyond the project's life (IFAD, 2015: 69). Smet *et al.* (1999) defined sustainability as continuing functioning of a certain developed service and its continuing utilisation by the group it was meant for resulting in the benefits originally aimed, while the external support has stopped. Existence of number of definitions on sustainability makes it difficult to choose one for application. Most of the definitions are universal, non-measurable and unclear. We need measurable and clear definitions of sustainability to be used in various situations. One thing in common among the three definitions above is continuity after cessation of external support. Hence, for the purposes of this study, sustainability refers to the ability of drilled wells projects in the study villages to continue functioning for long time in delivering the intended clean and safe water service to beneficiaries (villagers), and ability to roll back or recover promptly in case of breakdowns without donor support. In this study, if the drilled well breakdown and community members are unable to restore service for more than three months then it is considered non-functional hence non sustainable.

2.1.3 Indicators of sustainability

There are three major categories of conventional indicators of sustainability of community-based development projects namely social factors, economic indicators and

environmental indicators (Hellström *et al*., 2000). Based on these three broad indicators, researchers including (Schweitzer and Mihelcic, 2012; Panthi and Bhattarai, 2008) used them as a set multi criteria in assessing factors influencing sustainability of community-based water projects. For instance, Schweitzer and Mihelcic (2012) assessed sustainability of community management of rural water systems by categorising those indicators into internal indicators of a community and external indicators of sustainability. Other scholars i.e. Foster (2013 considers political and technological indicators as important to assess sustainability hence used political, environmental, social and technological (PEST) tool for refining and focusing contexts for development projects.

Contemporary scholars in Participatory Local Social Development (PLSD) i.e. Sharma and Ohama (2007) considers social, economic and environmental indicators to have deeper connotation. Based on those three broad indicators they proposed a comprehensive analytical framework comprised of five indicators for assessing sustainability namely; resources, organisations, norms, capability and institutional linkage (RONIC). In applying the PLSD framework Darma and Amandria (2012) indicated that strong organization with a set of norms promotes the sustainable development of local community. Similarly, Mahsyar (2016) applied PLSD framework to assess sustainability of community-based water projects using multi-criteria analysis. He concluded that characteristics of community members have significant impact on formation of people's organisation. Saleh (2018) applied PLSD based indicators to study how the patterns of group formation my stimulate changes in community. Moreover, empowerment is a necessary indicator of sustainability to increase the capability of the community to organize itself and manage problems using existing potential in order to adapt and cope with the occurring changes (Sharma and Ohama, 2007). Moreover, proponents of PLSD framework admits that

political and cultural indicators are necessary to measure sustainability hence they put forward social, political, economic, environmental and cultural (SPECE).

However, in this study, a set of multi-criteria indicators proposed in the National Water Policy of 2002 (URT, 2002) were used to assess sustainability of drilled wells projects. These indicators were successfully used by Mlage (2014) to assess sustainability of donor funded community groups investments. The National Water Policy recognises planning, implementation and post implementation stages of community-based development projects and that at each stage sustainability is measured by different indicators be it political, social, economic, technological or environmental.

2.1.4 Community

Community is a group of people with diverse characteristics, who are linked by social ties, share common perspectives, and engage in joint action in a specific geographical locations or settings (MacQueen *et al*., 2001). Smith (2001) defined community as a territory, locality or place where people have something in common, and this shared element is understood geographically. Community can also be defined based on interest hence community is a group of people who share common characteristics other than place. They are linked together by factors such as religious belief, sexual orientation, occupation or ethnic origin (Smith, 2001). The same Author defined community from communion perspective implying sense of attachment to a place, group or (in other words, whether there is a 'spirit of community'). A more appealing definition was given by Sharma and Ohama (2007) who considers community as locality, venue or a platform where self-help, collective actions are spontaneously taking place by the local peoples themselves. The author adopted Sharma Ohama's definition and adapted it to suit the study because it is more comprehensive considering community as platform for self-help in solving their

problems, ensuring ownership and sustainability of community-based development projects particularly the drilled wells projects. Therefore, in this study community refers to inhabitants of different ethnicities living in the study villages and engaged in collective initiatives to solve their common problems such as communal drilled wells projects.

2.1.5 Drilled well

International Association of Drilling Contractors (IADC) defined a drilled well as an artificial excavation or opening in the ground of more than 5.5m in vertical depth below land surface for the extraction of a natural resources such as groundwater, brine, natural gas or petroleum (IGWA, 2012). Since all the four drilled wells in this study are 70 m deep, machinery drilled and fixed with engine driven pumps they conform to IADC and Tanzania Drilling and Dam Construction Agency (DDCA) standards as opposed to other types of hand-dug short boreholes which are famous in Dodoma region. Therefore, for the purpose of this study, a drilled well is a borehole of 50m or more, in vertical depth below land surface, for extracting groundwater in the study villages (Appendix 5).

2.1.6 Project

The word project originally meant something that comes before anything else is done (Singh, 2015). Project management institute (PMI) defines a project as a work effort made over a finite period with a start and a finish time to create a unique product, service or result (PMI, 2012). It is a planned endeavour, usually with a specific goal and accomplished in several steps or stages requiring concerted efforts. Specifically, Kanda (2008) defined a project as a set of interrelated activities whose accomplishment leads to completion of a project. These activities consume time and resources and are governed by precedence relations. According to Kanda (2008), project can be at personal, local neighbourhood, organisational, national or global level. Kanda's definition catches the

author's preference since it put emphasis on order of precedence. In every project there are some aspects that come first and failure to follow that order may lead to sustainability problems. In this study, a project is a series of collective activities leading to achievement of a specific outcome within the community such as design, implementation, monitoring, maintenance and operation of drilled well to supply clean and safe water to target community members in the study area.

2.1.7 Community-based development project

The community-based development project (CBDP) refers to organised set of actions that codify the priority choices and desires of the community as a whole (Bartle, 2011). Others refer to CBDPs as social responsibility, community and humanitarian projects that involve high degree of engagement of stakeholders during execution to allow better accountability, transparency and stakeholder satisfaction (Camargo *et al*., 2017). Sharma and Ohama (2007) defined CBDP as smalls economic activity taken up by collectively by community members to translate into action or programme of development. The first two definitions take conventional approach as they focus on input and output (economic terms). On the contrary, Sharma and Ohama's definition has much wider connotation related to process of change in patterns of utilising and management of resources; value and norms attached to it. For that sake, in this study, CBDP refers to a drilled well fixed with mechanical pump that is communally managed and utilised by all members in the study villages.

2.1.8 Initiative process

Initiative process has been defined as a process performed to identify and define a new project or a new phase of an existing project by obtaining authorisation to start the project (PMI, 2012). Project Manager (2012) defined project initiative process as the necessary steps one need to undertake in order to ensure project is headed in the right direction from

the design stage and initiative process has three criteria namely (need based, resource mobilisation and willingness of stakeholders). The second definition is exhaustive, covering main criteria i.e. analysis of extent of problem, need or existing opportunities. It also calls for developing or review of project charter, identifying the stakeholders, securing budget, securing the sponsor, set up of project steering committee and organising the kick off meeting. These are very important details required in initiative process. Borrowing project manager's definition, in this study the author defined initiative process as series of realistic activities from design phase to implementation phase of community-based drilled wells projects in the study villages.

2.1.9 Sustainable development

Sustainable development, although a widely-used phrase, has many different meanings that provoke different responses. The concept of sustainable development is an attempt to combine growing concerns about a range of environmental, social and economic aspects of development. According to World Bank, sustainable development is one that is self-sustaining and meets the need of present and future generations (World Bank, 2001). Brundtland's Commission World Commission on Environment and Development (WCED, 1987) defined sustainable development as meeting the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development stands for development that endures and last; one that will not rollback or recede, even, in the face of threatening reversal waves (Omotola, 2006). In this study, sustainable development refers to positive progressive changes (such as enhanced peoples' capability to maintaining and operating their own water facilities, relieving poverty) taking place into the study villages as a result of accumulated experience from drilled wells projects without dependency on donor support.

2.1.10 Donors

According to Helleiner (2002), donors are persons, organisations be it local or foreign who donated something, aids, especially money to implement community-based development projects. Donors can be categorised based on location or level of operation hence there can be external i.e. non-profit organisation, international development organisation and internal or local donors i.e. community based organisations, faith based organisation or individuals. Donors are important especially in terms of financial, material and technical support community projects. But, too much reliance to donors tend to build dependency syndrome and kill self-help sprit which is necessary for sustainability of community-based development projects (CBDPs).In this study, donors are those organisations and governments which financed drilled wells projects in Tanzania. Since drilled wells are expensive ventures, donor role is required to finance drilling and externally sourced facilities such as pumps, engines and solar panel. For water sector in Tanzania major donors were: UK (DFID and Water Aid), USA (USAID and MCC), African Development Bank, the European Commission, Germany (GIZ), the Netherlands and the World Bank. Other donors include France (AFD), Japan (JICA), Belgium, Italy (LVIA), Switzerland, and Germany (Appendix 6).

2.1.11 Project stakeholder

Project stakeholder refers to an individual, group, or organisation, who may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project (Hwang and Ng, 2013). Beneficiary is part of stakeholder. A beneficiary is any person who gains an advantage and/or profits from something or facility. Donor of a particular project is also part of project stakeholder. In this study, a project stakeholder is any individual, organisation, or group of people that is involved by any means, benefit from, or is affected by the drilled wells projects in the study area (Appendix 6).

2.1.12 Stakeholder participation

There are different views pertaining stakeholder participation. Quist and Vergragt (2006) defined stakeholder participation as the process by which an organisation or a community project engages people who may be affected by the decisions it makes or can influence the implementation of its decisions. Other scholars including (Rose, 2003; Nombo, 1995) considers participation both as the means to achieve some predetermined goals, and the end, meaning the active and dynamic form of participation which enable local communities to play their role in development activities. From organisational point of view, organisation of stakeholders in groups, or committee is seen as instrument of participation. With regard to authors' view, stakeholders' participation refers active role played by various individuals or organisations in different stages of communal project, directly or in directly (Akhmouch and Clavreul, 2016). Stakeholder participation does not exclude role played by donors. Spontaneous groups such as cooperatives tend to be strong venue of development as a result of active participation of each member as compared to those formed by donors or external stakeholders. According to Mwanga (2011), advocates of participation (Chamber, 1997; Akhmouch and Clavreul, 2016) emphasise the importance of transferring power to the beneficiaries hence participation implies empowering and not dominating, facilitation rather than manipulation. In this study, stakeholder participation refers to engagement of various individuals and organisations in decision making process from planning, financing, implementation, monitoring, evaluation, management and utilisation of services resulting from drilled wells projects in the study area.

In Tanzania, there are varieties of traditional community participation such *as "Msaragambo" or "Siku ya Maendeleo"* (a specific day for development activities) (Mwanga, 2011). These are communally accepted type of collective self-help efforts in

which people participate to construct and maintain infrastructure such as schools, bore holes, feeder roads, and irrigation canals without demanding cash payment (Faty *et al*., 2012). For that sake, the LGA may decide to implement the government-initiated projects by utilising existing traditional experience to reduce the cost of implementation and maintenance of projects. To utilise traditional self-help efforts for government-initiated projects, it is very important to ensure the project are addressing the felt problem of the people during that particular time (Sharma and Ohama, 2007). Secondly it is important to consider people's daily life experience. In this sense, it is necessary to set up an organization at hamlet level (Darma, 2011; Chibehe, 2004; Kandie, 2001). In Tanzania, hamlet is the lowest and smallest administrative unit in which local people have been closely living together with a strong human relationship including trust. In order to enhance people's participation with their organisation, it is necessary to identify and make use of "achievement-oriented leaders" at *kitongoji.* These are influential people with ability to positively influence behaviour of fellow community members and hence they have followers. With these achievement-oriented leaders in the organisations as leaders or just members is one of the secrets of success in government-initiated projects because they stimulate changes with the community. Achievement-oriented leaders tend to catalyse the entire community to willingly and proactively participate in their development projects at any level (Faty *et al.,* 2015). It is strongly recommended to encourage these leaders to strictly apply village by-laws for government-initiated projects and to create understandings of people first at *kitongoji* level toward government initiated projects.

2.1.13 Extent of stakeholder participation

Extent of stakeholder participation refers to the level at which stakeholders actually participate in the decision-making process and accepting their decisions (Green and Hunton-Clarke, 2003). One thing is obvious that there is need for incorporating people's

participation in community development venture. Extensive stakeholder participation is important because human capital is a key factor in any development endeavour. The knowledge, attitude, skills and experience embedded within human capital are necessary in sustaining the community-based development projects.

According to Nombo (1995), participation takes place at three levels. (i) Provision of resources e.g. contribution of material and labour, (ii) in decision making process e.g. in meetings, committees, as elected leader or champion of a given activity (iii) participation in produced benefits (output participation) e.g. sharing of surplus generated. The author tends to differ with proponents of any of the three levels above when taken singly. Combination of all the three levels would constitute the real meaning of stakeholder participation. In this study, definition by Sharma and Ohama (2007) referring to "genuine participation" implying active stakeholders' participation in every stage of the project and at all levels of decision making is accepted. This definition recognises active participation especially of beneficiaries in matters related to their development as a right not a favour. Therefore, extent of stakeholder participation implies the degree of actual engagement of various stakeholders in decision making, implementing and benefiting at all stages of drilled wells projects. In this regard (zero participation meaning that key stakeholders were just informed of intended project and never got involved in decision making; tokenism type of participation meaning that key stakeholders had limited participation; and genuine participation meaning that the key stakeholders had taken part in decision making process in all stages of project cycle).

2.2 Empirical Literature Review

Empirical literature review refer to thorough and up-to-date review of existing various research works relevant to topic being studied focusing on major points and key concepts

as well as relationships between those concepts. The purpose of empirical literature review is to improve researcher's understanding, build expertise, demonstrated knowledge of the subject matter in a particular field of study. In this study empirical literature review will also help the researcher become up-to-date as well as identifying the knowledge gap.

2.2.1 Community-based development projects

Various authors (Sharma and Ohama, 2007; Mansuri *et al*., 2003) admit that community based-development projects (CBDPs) are the means to promote Community Driven Development (CDD). According to Ohama (2002), CBDPs are considered as catalytic measures for development as they are intended to address common needs instead of individual needs. Lack of sustainability in CBDPs is, however, an outcry of development stakeholders, especially in the least developed countries (Salaka, 2004).

For a CBDP to succeed, awareness creation is considered an entry point and an important stage by sensitising the community until the critical mass has been reached (Helene *et al.*, 2013; Ohama, 2002). Community sensitisation creates awareness of present situation in order to encourage positive change in the future and readiness to act in a proposed idea (Sharma and Ohama, 2007). With respect to project design Howlett and Nagu (1997) argue that for CBDPs to became sustainable, they must be developed by taking into account local peoples' needs and problems, as well as the situation surrounding local society; and in order to understand these aspects a context analysis (CA) must be carried out prior to project design. According to IFAD (2007), community projects should have clear and relevant purposes, goals, vision and roadmap for sustainability. Sharma and Ohama (2007), notes that a successful community project must ensure appropriateness of support elements (resources, organisations and norms (RON). Project plans should be developed in logical manner to ensure linkages among these development elements and

that implementation approach should be phased out strategically according to activities and efforts required.

Cleaver and Toner (2006) calls for appropriateness of management of project by considering the adequacy of selected organisations at each stage of development phase of a project. Other important features of sustainable CBDP are adequacy and effectiveness of participatory approach (conscientisation, organisation building, experience-based learning, capability building and institutional networking) (Sharma and Ohama, 2007). Haysome (2002) and Sharma and Ohama (2007) share the same view that effective coordination mechanism among concerned parties is an indispensable factor for smooth implementation and management of community projects. Assurance of financial resources for required inputs is another important aspect. In this regard, Leif (2006) argues that development requires empowerment. It is therefore a pre-requisite to ensure timely provision of necessary inputs for carrying out a project in sustainable and effective ways. In order to assist undertakings by local people in an effective manner, revision and re-arrangement of legal and institutional set-up might be required (Ohama, 2002). This will help towards legal recognition to avoid confusion that might arise in the course of project life.

Concrete monitoring and evaluation (M&E) scheme needs to be established and indicators determined at planning stage in order to assess the progress and achievement and to effectively cope with problems encountered along the process of project development (Howlett and Nagu, 1997). It is argued that M&E is meaningless if it has no feedback mechanism of outcome so as to help the actors make necessary adjustments (Kay, 2000; Boydell, 1999; Cartar *et al.*, 1999). With respect to environmental issues, sustainable community development projects are necessary to try to minimise potential adverse effects on natural and social environments by the project (Blewitt, 2008). This is possible if there

is prior consideration of potential effects to environment and gender aspects (URT, 2000b; Haram, 1999; Swantz, 1985). On the contrary, a project may be affected by prevailing and surrounding social and environmental circumstances, hence these should be considered in advance (Larsson, 2000).

2.2.2 Initiative process of community-based development projects

Various authors (Larsson, 2000; Assmo, 1999; Howlett and Nagu, 1997) admit the importance of appropriate approach in initiation process for community-based development projects. In developing countries from 1960s to early 1990s, there was emphasis in imposing development from top-downwards through ready-made solutions or projects for community members to implement one size fits all approach (Larsson, 2000). Although the imposed donor-supported projects were beautifully prepared with strong assistance from donors, the projects composed of rigid logical frameworks, which did not provide room of flexibility so that community members could make necessary alterations according to a prevailing situation (Ohama, 2002). Moreover, these projects did not consider the reality since no detailed assessment of social context was carried out prior to project initiation (Sharma and Ohama, 2007). In addition, there was little room left for trial and error, no way for experience-based learning process, no room for action-reflection process. These types of projects were rarely sustainable, since the basic principles of sustainability were contravened.

Mwanga (2011) noted that in 2002 for example that Tanzania introduced an innovative bottom-up participatory planning and budgeting process popularly known as Opportunities and Obstacles to Development (O&OD). This process to some extent has decentralised project-planning process to grass root communities but it does not empower the communities to take initiatives. Decentralisation of the project planning process is

provided for, by article 8 of Tanzania constitution of 1977. It confers power and right for planning and decision-making process to the people. The essence of decentralisation of project development process is to create local autonomy through spontaneous and endogenous process, as recommended in a study conducted by Zadeh and Nobaya (2010), that in order to achieve sustainable development in the community, community members should be engaged directly in the process of development right from conception of project ideas. Development is more than improvements in people's well-being; it is also the capacity of the system to provide the circumstances for that continued well-being. Development is a characteristic of the system; hence sustained improvements in community and individual well-being are a yardstick by which it is judged.

It is further emphasised that community members must hold the stake in the assessment of the local context in terms of existing opportunities and obstacles, in prioritisation exercise and in decision making to choose a right community project that addresses their felt needs. Beneficiaries must be engaged in planning the project, implementing, managing, monitoring and controlling the project (Howlett and Nagu, 1997). One of the shortcomings of O&OD process is the tendency of addressing community priorities rather than community initiatives (CIs), it lacks sufficient social context analysis, social preparation, monitoring and evaluation mechanism (Faty *et al.*, 2015;Mwanga, 2011).

It has been observed by Ohama (2002) that sustainable development is a spiral process carried out by beneficiaries themselves rather than "one-shot" event by external agents. In initiation process, self-organisation of beneficiaries and self-help spirit are of crucial importance because they help community to advance in the next stage of development (Cleaver and Toner, 2006). According to Kandie (2001), using an experience from north Ghana, local organisations are crucial elements in the project initiation process. These

organisations must be supported by appropriate constitution, by-laws, and national development vision to ensure sustainability of projects. Many studies consider the presence of local organisation as a sufficient condition for sustainability, but in reality, the nature, composition and strength of these organisations are most important factors than organisation itself (Sharma and Kusago, 2008; Ohama, 2007; Chibehe, 2004). A study conducted by Shikuku (2012) affirms that strength of these local organisations is determined among others by inclusion of women as key stakeholders in community development projects.

2.2.3 Participation in community-based development projects

From 1990s, community participation in their development initiatives has received increased attention in international, national and local policy levels (URT, 2011; Sharma and Ohama, 2007; Howllet and Nagu, 1997; Scoones and Thompson, 1994). Community participation is considered as a means and an end in itself (Rose, 2003). According to Abiona and Bello (2013), participation is considered as a means to enhance decisions making process, setting development agenda and formulation of norms that guide development process. Atkinson *et al.* (2011), in their case studies, attempted to determine the effect of community participation on disease transmission. The results showed statistically significant reductions in disease incidence or prevalence using various forms of community participation. According to Nicole (2002), direct community engagement in programme design and implementation, helps ensure that strategies formed are appropriate for and acceptable to the community. Community participation promotes shared responsibility; community members often mobilise local resources, experiences, and skills that may not otherwise be available (Helene *et al.,* 2013; Faty *et al.,* 2012; Chambers, 1994).

The main contended issue in participation is the extent of participation in community development projects (Sharma and Ohama, 2007; Makonda, 2003). In addressing the extent of participation, Tanzania enacted public-private-partnership (PPP) Act, of 2010 (URT, 2010b) which allow collaboration of local communities with private sector. On the extent of participation, Pretty (1995) presented a seven-step ladder of citizen participation. The steps were: passive participation, participation in information giving, participation by consultation, participation for material incentive, functional participation, interactive participation, and self-mobilisation. However, the critiques levelled against Pretty's classification include overlap of some classifications which make it difficult to grasp the entire continuum (Sharma and Ohama, 2007). In response, Rose (2003) came up with alternative seven ladder of participation (use of service, contribution of resources, attendance at meetings, consultation on issues, involvement in delivery, delegated powers and decision-making, 'real' powers and decision-making). Other scholars including Sharma and Ohama (2007) and Cleaver (2006) are concerned with the extent of participation rather than the form of participation expressed in the works by Pretty and Rose as indicated above. Their concern is whether there was "genuine participation" or not. Hence Sharma and Ohama (2007) came up with a more practical ladder of three levels measuring extent of participation as indicated in Table 1. According to authors, either there is no participation at all, or there is "tokenism" type of participation or there is genuine participation through partnership or local autonomy as indicated in Table 1.

Table 1: Three levels on extent of stakeholder participation in development projects

Zero participation ⟷		*Genuine participation*
Authoritarian Approach (Social Development in the Modernisation Approach)	**Tokenism**	**Participatory**
i) All Programmes / projects are planned and implemented solely by donors/governments with no people participation in decision making;	i)Programmes /projects are presented to people so that they have opportunities to their own opinions on given ideas;	i)Partnership on an equal basis between the government and local people are to be realized in the phase of decision making and implementation; and
ii) Programmes /projects planned by governments, are just informed/announced to the people.	ii) Programmes/projects are planned by governments, while people are to participate in their implementation in terms of labour and other material resource inputs.	ii) Local people themselves make their own decision and assume full responsibility in the project planning, implementation, monitoring and evaluation with supports from non-governmental organisation (NGOs) and governmental organisation (GOs).

Source: Sharma and Ohama (2007)

A genuine participation of key stakeholders is fundamental in development process because it provide chance for beneficiaries to take initiatives in solving their own felt problems to attain their felt needs. Without community initiative community cannot attain self-reliance which is characteristic of empowered community. Most of practitioners of participatory development including Cheetham (2002) agree that community members are a rich source of knowledge about their community and have required energy and commitment to that community which are necessary to ensure sustainability of their collective efforts. In order to promote genuine participation of the people participatory approaches and methods such as participatory rural appraisal (PRA) were developed (Chambers, 2007; Chambers, 1994). A genuine participatory planning takes place only when the members of entire local society are on the centre of planning process. Skills and attitude are enhanced as they undergo the process of identifying, reviewing, planning, implementing and evaluating community projects (Mwanga, 2011; Chambers, 1997).

Genuine participation of stakeholders, right from project design stage, is viewed as a tool for improving the efficiency of a project, assuming that where people are genuinely engaged, they are more likely to take over new project and partake in its on-going

operation and maintenance (Cusack *et al*., 2006; Chibehe, 2004). Genuine participation is a fundamental right; that beneficiaries should have a say about interventions that affect their livelihoods (Pretty, 1995). Moreover, Ohama (2002) asserts that genuine participation is a key instrument in creating self-reliant and empowered communities, stimulating village-level mechanisms for collective action and decision-making. Similar observations have been highlighted in various studies (Shikuku, 2012; IFAD, 2007; Oakley and Halika, 1991). The study by Chifamba (2013) revealed that lack of capable local organisations, lack of resources, and lack of information are some of the factors contributing to limited genuine participation in rural development initiatives.

According to Nombo (1995), participation in communal activities is influenced by a number of factors: (i) Availability of conducive environment for participation e.g. education level, domicile status, gender, religion, culture, political stability; (ii) degree of persuasion, facilitation or coercion; (iii) motive: individuals join the move with certain motives or expectation continued participation will depend on whether participants' expectations are fulfilled; (iv) presence of reciprocal communication and interaction is essential for effective participation; (v) competence or capability of participants e.g. committee members in important for effective participation; and (vi) trust relationship: trustworthiness among participants may promote or discourage continued participation of some local actors, e.g. the use local people as source of knowledge instead of partners.

It has been noted by Mlage (2014) that international donors have played a significant role in development projects in Tanzania by assisting community/government to implement sectoral system reforms. Water sector is one of the sectors that has benefited from international donors (Appendix 6). About 88% of the water project funds in Tanzania were provided by external donor organisations during free water for all era 1970s-2000. The

major concern with regard to donor-funded development projects has been the weak interaction, cooperation and collaboration among stakeholders which is necessary for sustainability CBDPs. According to Mwansasu (2011), many large water projects that were established by central governments with support from international donors and later handed over to community failed, partly due to inadequate community participation in planning and implementation of such rural domestic water supply projects. In order to ensure sustainability, it is therefore important to consider all factors that affect stakeholder participation.

2.2.4 Factors affecting sustainability of community-based development projects

In broad terms, factors affecting sustainability of community development projects are grouped in three categories, namely: social, economic and environmental factors. Sometimes these factors are considered as the "three pillars" of sustainability (WCED, 1987). Previous studies (Abiona and Bello, 2013; Mwanga, 2011; Sharma and Ohama, 2007; Ohama, 2002) have been conducted on factors affecting sustainability of community-based development projects and reported different views. Considering social dimension of sustainability, Sharma and Ohama (2007) pointed out that donor-supported development activities are formulated with limited understanding of existing reality in the local community. This kind of oversight leads to projects which are not addressing the real felt need of the community. They tend to overlook existing potentials such as local capabilities, development oriented traditions and experience with regard to collective initiatives. Moreover, Ohama (2002) reports that in development process involving external interventions, there is little, if any, purposive efforts to mobilise the existing local experiences, values, structures, mechanisms and indigenous resources. There is a predisposition to forget that sustainable development starts from within, not from outside of the society (Mwanga, 2011). Ostrom (2005) was concerned with socio-economic

characteristics of community members, heterogeneity of communities, institutional diversity, social and geographical location for the common resource as potential sources of intercommunity conflicts in CBDPs. A study conducted in Nigeria by Abiona and Bello (2013) showed that political instability, leadership problems, communal clashes, inadequate funding and poor accountability impeded sustainability of CBDPs.

From economic point of view, it has been noted that from 1990s, following structural adjustment Programmes (SAPs) and local governance rushed reforms imposed by International Monetary Fund (IMF) and the World Bank (WB),development projects were decentralised and the concept of cost sharing was introduced. Since then, the beneficiaries had to manage the projects and pay for services rendered (URT, 2002). This was good step but it came when it was to too late, it should have been introduced during planning stage. In cost sharing arrangement community's willingness to pay for services was considered to be an important step towards sustainability (Kaliba and Norman, 2004). However, Haysome (2006) observes that although willingness to pay exists in some projects, financial management of revenue generated from community projects is the main concern. Taylor (2009) uses case studies to perform simple economic analysis in selected projects and the result shows that financial viability of community-based projects depends on type of management in place. Where private sector is involved, financial management has been observed to improve as compared to when community members are operating the project (Makonda, 2003). Nonetheless these results defeat the philosophy of decentralisation and local autonomy.

Components of environment (air, water, soils) are considered as a foundation upon which all development projects are established (URT, 1997). Therefore, environmental factors such as water and air pollution and degradation of water sources are of paramount importance to sustainability as they influence differently on community-based

development projects (Kusago, 2008; WCED, 1987). According to National Environmental policy (NEP) of 1997 environmental factors may take a form of air and water pollution, salinity, land degradation, limited accessibility, loss of biodiversity and habitats, aquatic system degradation or deforestation (URT, 1997). Howlett and Nagu (1997) in their book on participatory planning insist on environmental assessment to ensure sustainability of community projects. In addressing environment factors, Nkonya (2008) calls for concerted efforts including customary institutions and customary norm to enhance sustainability of CBDPs.

2.2.5 Research gap

Empirical scholarly outputs reviewed above concurs with idea that sustainability is topical problem in donor-funded, community-based development projects. During planning stage most of scholars e.g. Sharma and Ohama (2007) associate sustainability with a number of factors admitting the importance of appropriate approach in initiation process for community-based development projects. Previous research studies e.g. Mlage (2014) agree on importance of donor support but differ on the fact that donor-supported development activities are formulated with limited understanding of existing reality in the local community including community personal and situational characteristics of target communities e.g. the felt problems and felt needs. The characteristics of beneficiaries determine how capable and experienced in planning, implementing and maintaining communal project such as drilled wells projects. Also, there is a contradiction between approaches i.e. top-down ready-made solutions or projects versus bottom-up approach promoted through decentralisation by devolution. In initiation process the question is whether key stakeholders e.g. community members are really holding the stake as main actor. Another disparity is that there has been weak interaction, cooperation and

collaboration among stakeholders, an aspect which could influence sustainability of CBDPs.

During implementation stage stakeholder participation is crucial aspect. In that regard, most of the empirical literature i.e. Sharma and Ohama (2007) and Cleaver (2006) agrees on the critical importance of stakeholder participation in all stages of project as a key determinant of sustainability. However, they differ on the "extent" of participation in community development projects. While the most of literature talk of levels of participation, little attention is paid to extent of participation in the sense zero participation, tokenism and genuine participation.

Sustainability after donor has withdrawn that is post implementation stage, most of empirical literature i.e. (Sharma and Ohama, 2007; Howlett and Nagu, 1997) agrees on the three pillars of sustainability (social, economic and environmental factors) which are context specific and cannot be generalised from one place to another due to dynamic nature and characteristics of target community members. These are many including willingness to pay financial management of revenue generated from community projects are main concerns. These factors differ depending on type of projects involved. Factors affecting service oriented projects such as drilled well project tend to differ.

2.3 Theoretical Framework

A theoretical framework consists of concepts and, together with their definitions and reference to relevant scholarly literature, existing theory that is used for a particular study (Gray, 2014). The theoretical framework helps researcher to understand of theories and concepts that are relevant to inform the study and helps to develop conceptual framework.

According to Sharma and Ohama (2007) and Mahgoub and Fatma (2012), two schools of thought have emerged in relation to community-based development projects, namely growth oriented theories and endogenous development theories. The first school of thought, groups together all the theories of development which put more emphasis on resource supplement i.e. modernisation and dependency theories (Sharma and Ohama, 2007). These are the theories of the 1950s to the 1990s which have failed to provide direction for sustainable development in least developed countries (LDCs) including Tanzania (Kusago, 2008; Sakamoto, 2003). The main bottleneck of these theories is that they are oriented mainly to external resource supplies while neglecting the importance of locally available human, physical, natural resources; building local capabilities and self-help efforts which are the fundamental elements of sustainable development (Stiglitz *et al.*, 2010; Sharma and Ohama, 2007). Growth oriented theories are a little bit sceptical because they propagate dependency while suppressing self-determination of community towards their projects, which are crucial in sustainability studies.

The second school of thought grouped together all the theories which support endogenous development. According to Ray (1999), endogenous development refers to integrated, participative, bottom up development stemming from people's own efforts. For that sake, endogenous development put emphasis on; local determination of development options, local control over the development process, and the retention of the benefits of development within the locale (Slee, 1993). Theories in this group are: Endogenous Paradigm, Basic Human Need (BHN) theory, Liberation Paradigm, Eco-Development Paradigm, Actor Network Theory (ANT) and Common Property (CP) theory (Kusago, 2008; Sharma and Ohama, 2007).

With respect to theoretical framework, this thesis was informed by Endogenous Development theory put forward by Hammarskjöld (1977) and published as "Another development, approaches and Strategies". According to this theory, development has five characteristics as follows: (i) need-oriented, that is being geared to meeting human needs, both material and non-material; (ii) endogenous, that is, stemming from the heart of each society, which defines in sovereignty its values and the vision of its future; (iii) self-reliant, that is, implying that each society relies primarily on its own strength and resources in terms of its members' energies and its natural and cultural environment; (iv) ecologically- sound, that is utilizing rationally the resources of the biosphere in full awareness of the potential of local ecosystems as well as the global and local outer limits imposed on the present and future generations; and (v) based on structural transformations, required, more often than not, in social relations, in economic activities and in their spatial distribution, as well as in the power-structure (Sakamoto, 2003; Hammarskjöld, 1977).

The choice of the theory was based on the need to promote indigenous innovations as evolving alternatives to development (Banerji, 2004). Endogenous theory recognises and respects local values, by-laws, peoples' organisations, institutions, policies and processes, while exogenous development tends to trample over them (Darma, 2012). In countries that are pursuing decentralisation by devolution (D by D) like Tanzania, endogenous development theory is quite relevant in judging whether communities are on the right track or not. The need for the endogenous development theory particularly in Tanzania is compelled by the fact that community-based development projects have been decentralised to lower levels of local government (LLG) mainly village level (Mwanga, 2011). However, from practical point of view, at village level there are many incomplete projects, dysfunctional facilities mainly because the self-help sprit is neglected. Instead, the existing approaches accelerate dependency. The theory advocates "inward looking" to

effectively use of existing local capabilities for sustainable development (Leif, 2006; Christopher, 2000).

With respect to theoretical gap, the literature reviewed has established a struggle by scholars of sustainability field to find the right strategies corresponding well to the goals and designs of community-based development projects. Traditionally, the focus of proponents of growth oriented theories has been whether community priorities are been addressed or not. Resource supplements from outside are considered to be indispensable support to fulfil the community priorities. On the contrary, the scholars pro endogenous development theories i.e. Sharma and Ohama (2017) with due respect on the importance of resource supplements, are putting emphasis on community initiatives as a key factor to sustainability of community-based development projects. Therefore, this study intends to fill this gap by stressing the importance of collective, self-help community initiatives in all stages of project.

2.4 Conceptual Framework

Conceptual framework is a visual or written product that explains, either graphically or in narrative form, the main things to be studied including the key factors, concepts, or variables and the presumed relationships among them (Denzin and Lincoln, 2011). In view of the empirical literature and theoretical aspects reviewed in section 2.2.5 and 2.3, the conceptual framework presented in Fig. 1 was developed and used to guide the study. The conceptual framework for this study looks at the factors influencing sustainability of community-based drilled wells projects.

The linkage between background, independent and dependent variables was analysed hypothesising that they are related. The conceptual framework for this study (Fig. 1)

shows how the background, independent and dependent variables are interrelated. With regard to background variables, the study focused on community members' characteristics (personal and situational), drilled wells initiative process, extent of stakeholders' participation in various stages of drilled wells projects; social, economic and environmental factors influencing sustainability. In the framework, sustainability of drilled wells for improved community livelihoods is achieved through improvements in social, economic and environmental dimensions and the inter-relationship existing between and among the variables.

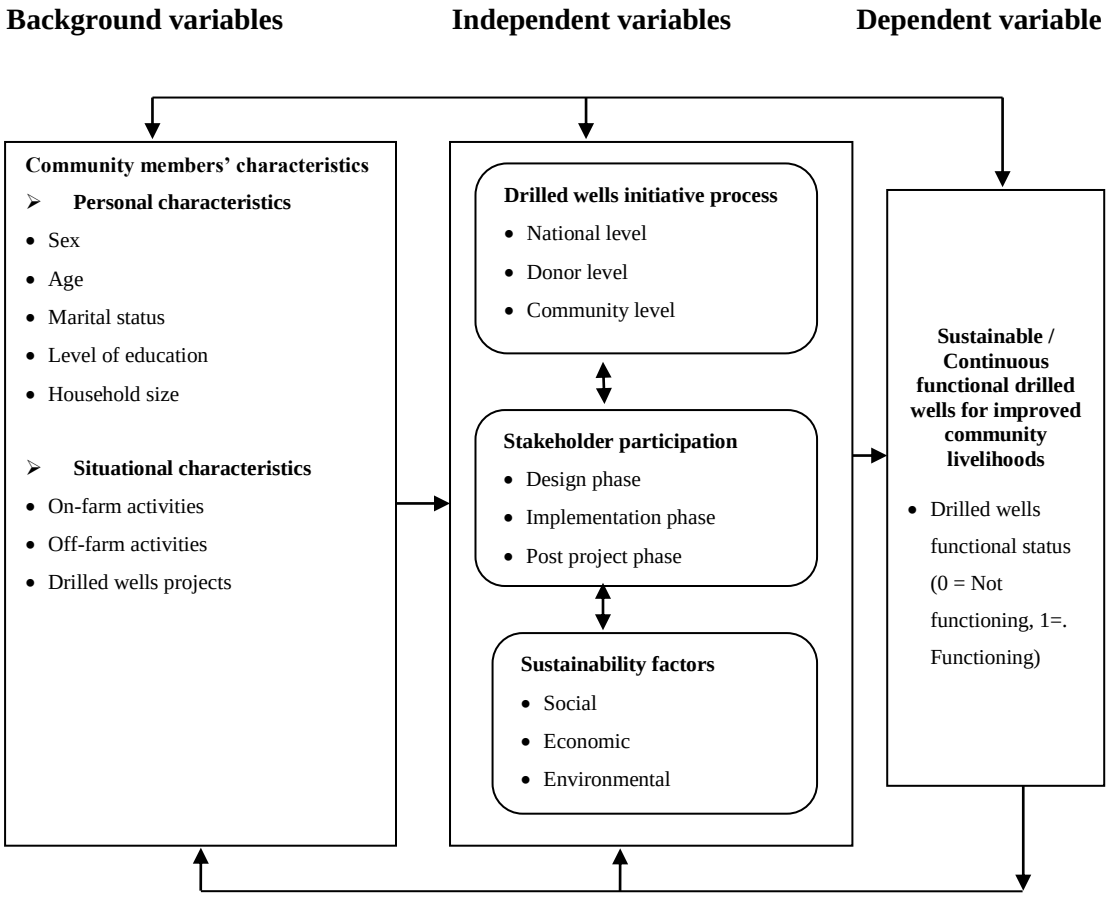

Figure 1: Conceptual framework of the study

2.5 Linkages between Conceptual and Theoretical Frameworks

The advantage of conceptual framework presented in Fig. 1 is that it is strongly backed by Endogenous Development Theory, which advocates recognition of traditional systems and

structures, local resources, organisations and institutions to foster sustainable community development initiatives. The framework is relatively simple to visualise the interaction of variables and resultant outcomes. For instance, the community members have personal and situational characteristics which influence their projects' initiation process, participation in various stages of projects and sustainability factors. At national level the Central Government (CG), Local Government Authorities (LGAs) and other stakeholders do formulate policies, design development programmes and projects which are implemented at the local community level. At donor level, the International organisations financed the drilled wells projects. LGAs are formulating and enforcing by-laws and ideally providing social and economic types of support which influence degree of community ownership and operation of community-based development projects.

On the other hand, community members provide services and pay for resulting services which influence sustainability of their development projects. Sustainability of community-based development projects will depend mostly on the extent of participation, interaction, collaboration and cooperation among the parties involved. Sustainability of drilled wells projects leads to improved livelihoods of community members. In return, once the drilled wells are sustainable and livelihoods of beneficiaries are improved, then the social, economic and environmental contexts tend to improve as well. Capability and willingness of stakeholders to participate also tend to improve. Stakeholders at national, donor and community level are encouraged to support community initiatives. The framework allows drawing implications on the extent to which drilled wells projects were sustained so as to advice responsible parties to take necessary action to improve sustainable community initiatives in Tanzania. Endogenous development theory is embedded within participation and characteristics of communities which influences their active participation.

In the conceptual framework the background variables were: sex, age, and marital status, level of education, household size, on-farm activities, off-farm activities and involvement in drilled wells projects. These are the basic factors which determine characteristics of community to sustain their development projects. Independent variables were: initiative process at national level, donor level and community level. Extent of stakeholder participation was captured through respondents' opinion on extent of engagement at design phase, implementation phase and post project phase. Likewise, social, economic and environmental sustainability dimensions were captured through respondents' opinion. The dependent variable was a dummy using functional status (0 = Not functional and 1 = Functional) of drilled wells. The interdependence and linkages among different variables are indicated using arrows in Fig. 1.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

The research methodology is a scientific and systematic way to search for pertinent information on a specific topic aimed at solving the research problem. It is both an art and science of scientific investigation (Kothari, 2004). This chapter presents a detailed account on how the research was conducted. It is organised in nine sections namely: (i) study area, (ii) research approach, (iii) research design, (iv) sampling procedures, (v) data collection methods, (vi) data collection instruments, (vii) data processing and analysis, and (viii) ethical consideration and (ix) limitations of the study.

3.1 Study Area

The study on which this thesis is based was conducted in Kondoa and Chamwino Districts of Dodoma Region in Tanzania (Fig. 2). The region was selected purposively based on the premise that the problem of non-functional drilled wells projects is wide spread (Haysome, 2006; URT, 2012b), and it ranks top in the list of drought stricken areas of Tanzania (MAFSC, 2006). According to URT (2013) the rate of non-functionality of water points in this region is relatively high (44.89%), and there are limited alternatives to water sources. Dry as it is, Dodoma Region represents semi-arid regions (Simiyu, Singida, Tabora and Shinyanga) which are characterised by severe droughts and little perennial surface water (Swai *et al.,* 2012; URT, 2002). Dodoma receives an average of 538 mm of rainfall per annum lasting only from December to April, hence a critical water shortage during dry season. Moreover, rural districts of Dodoma region are marginalized areas as far as social service provisions are concerned i.e. there are problems in relation to water, health, reliable roads and education. Therefore, the communities rely on groundwater from drilled wells. The study took place in four purposively selected villages, namely Bereko and

Kingale in Kondoa District, and Haneti and Membe in Chamwino District (Fig. 2). Selection of the two districts was guided by the fact that they were more vulnerable rural districts of Dodoma region in terms of non-functional water points (38.70% and 51.1%) for Kondoa and Chamwino district respectively (Appendix 8).

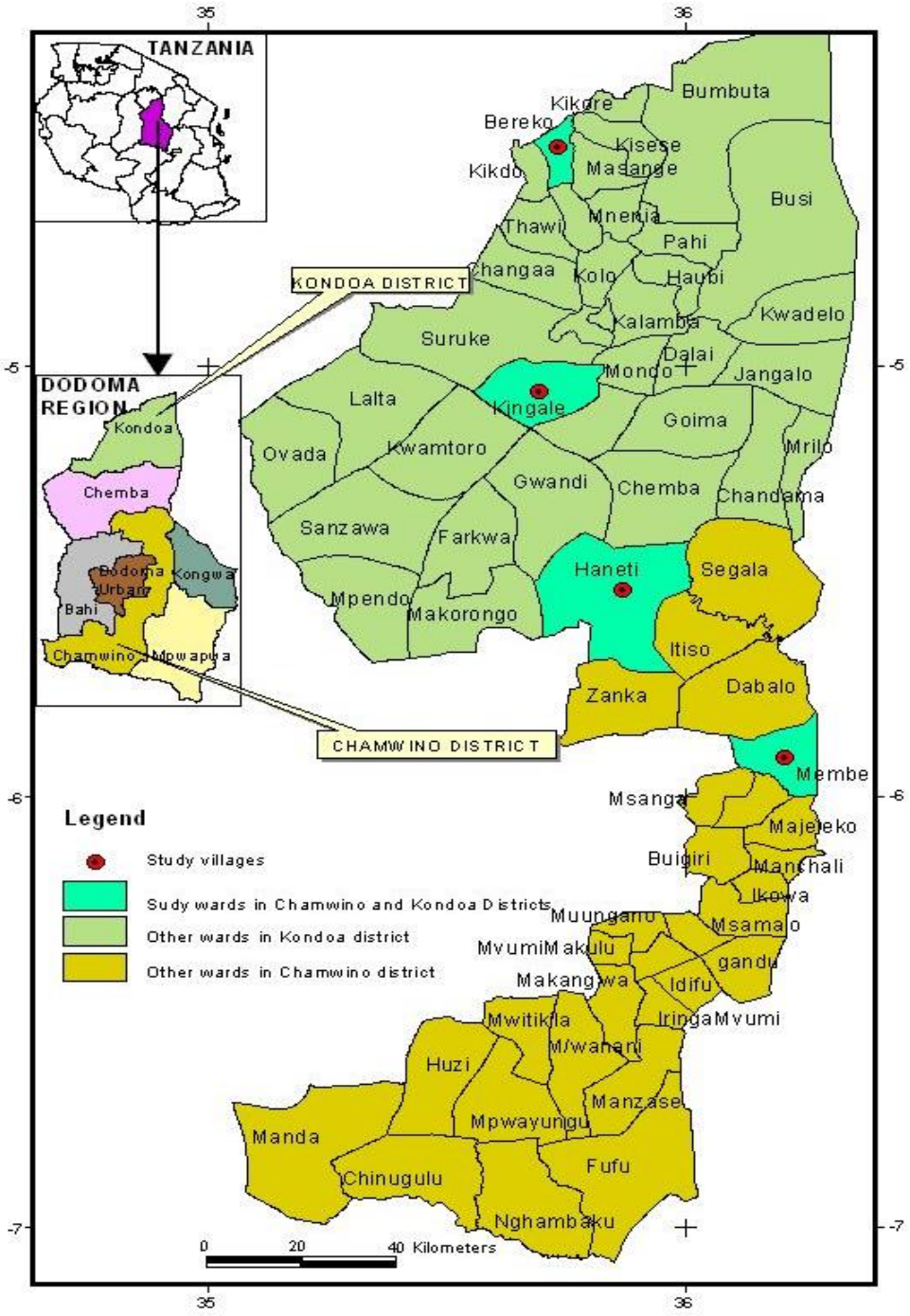

Figure 2: Map of Dodoma Region showing the study districts, wards and villages

These disadvantage settings make the two districts vital to study sustainability of drilled wells projects. The case study involved four drilled wells that are the subject of this thesis Fig. 1.

3.2 Research Design

Research design refers to the plan for collecting, analysing and utilising data in order to attain the intended information while ensuring validity and reliability of the research facts (Kothari, 2004). This study adopted both qualitative and quantitative research approaches. The combination offers a better understanding of the research problem and increase the accuracy of data than a single method (Creswell, 2013). A cross-sectional research design was employed to collect information. The design entails collection of data on a number of cases at a single point in time (Yin, 2013; Denzin and Lincoln, 2011). The data are then examined to detect patterns of association (Bryman, 2004; Gujarati, 2004). The design also allows researchers to compare many different variables at the same time (Bryman, 2006).

3.3 Study Population

Population refers to a group of individuals, objects or items from which samples are taken for measurements. It is a complete set of individuals, cases or objects with some common observable characteristics (Kothari, 2004). In this study the population was composed of all community members involved in the community-based drilled wells projects in Kondoa and Chamwino Districts of the Dodoma Region, because they are the main stakeholders in those drilled wells projects.

3.4 Sampling Procedures

Sampling procedure is defined as the process or technique of selecting a suitable sample which represents the population from which it is taken for the purpose of determining

characteristics of the whole population (Kothari, 2004). In this study both non-probability (purposive) sampling and probability (systematic) sampling techniques were used. Purposive sampling is the process of selecting the specific target group for getting unique information (Creswell, 2013). It involves the deliberate choice of informants or locations basing on the qualities they possess, which are relevant to the study. Systematic random sampling is a type of probability sampling technique. With the systematic sample, there is an equal chance (probability) of selecting each unit from within the population when creating the sample (Creswell, 2013). The systematic sample is a variation on the simple random sample. Rather than referring to random number tables to select the cases that will be included in the sample, units are selected directly from the sample frame. The sub-sampling frames for this study were village registers of all household heads (HHs) in Chamwino and Kondoa Districts who were beneficiaries of the drilled wells projects. A sampling unit was a household from which male and female household heads (FMHHs) were chosen. Key informants were also selected and involved in the study. A multi-stage sampling technique, advocated by Kothari (2004), was adopted in this study under two main stages, as follows:

Stage 1: Geographical location: The first sampling stage involved purposive sampling of divisions, wards and villages based on evidence of existence of both functional and non-functional drilled wells projects in Chamwino and Kondoa Districts. There are five divisions, 32 wards, 77 villages in Chamwino District; and four divisions, 28 wards and 97 villages in Kondoa District. Each division had more than two wards and each ward had more than two villages in both districts. Hence, two divisions were purposively based on evidence of existence of both functional and non-functional drilled wells projects. These were identified from each district, namely; Itiso and Makang'wa in Chamwino District, and Kondoa Mjini and Bereko in Kondoa District. In turn, one ward was purposively

selected from each selected division, namely Haneti in Itiso Division and Membe in Makangw'a Division in Chamwino District; Bereko in Bereko Division, and Kingale in Kondoa Mjini Division in Kondoa District. In each of the ward, villages were stratified into two strata and purposively selected. Stratum one was formed of those villages with functional drilled wells projects and stratum two was formed of villages with non-functional drilled wells, namely: Haneti (functional) and Membe (non-functional) village from Haneti and Membe Wards, respectively, in Chamwino District; Bereko (functional) and Kingale (non-functional) from Bereko and Kingale Ward, respectively, in Kondoa District. Hence, four villages (one with a functional drilled well and one with a non-functional drilled well) in each of the two selected districts were identified and involved in the study.

Stage 2: Study respondents: The second stage involved selection of community members' household heads (CMHHs) respondents based on coming from either selected functional or non-functional drilled wells identified village projects. A total of 400 CMHHs respondents, including308 male household heads (MCMHHs) and 92 female household heads(FCMHHs),were selected using systematic sampling techniques as follows:180 CMHHs (139 MCMHHs and 41 FCMHHs) from functional drilled wells and220 CMHHs (169 MCMHHs and 51 FCMHHs) from non-functional drilled wells. To get that sample, after arriving at any particular study village, the researcher obtained village register of households engaged by any means in either functional or non-functional drilled wells. Each of the selected villages had a minimum of 240 households (HHs) involved in a particular drilled well. The HHs in each of the selected villages were stratified into FCMHHs and MCMHHs. Sampling interval "k" was obtained by dividing the population "N" over the desired sample, "n". The starting point was randomly selected. Taking a case of Haneti village with 240 CMHHs involved in drilled well, the

researcher selected 84 CMHHs; using a sampling interval of 182/65 = 3 to select 65 MCMHHs respondents from the male stratum and 58/19 = 3 to select 19FCMHHs) respondents from the female stratum. A similar procedure was used in all the other selected villages to get the desired proportionate sample of 400 (Table 2). Gender sensitivity in sampling was necessary to ensure opinion of both female and male households were included in the sample and to understand their roles and responsibilities in drilled wells projects in the context of water policy of 2002. This was achieved by stratifying male and female respondents. Concerning the sample size of 400, it is argued by Gray (2014), that a sample of 30 or more is recommended in most ex-post research for meaningful analysis. Large sample was used to enhance rigorous inferential analyses that were involved in the study.

Table 2: Summary of sample size (n=400) for structured interviews at household level by sex

Village	Stratum of drilled well	Members of Community by Sex			Sample by Sex		
		MCMHHs	FCMHHs	Total	MCMHHs	FCMHHs	Total
Bereko	Functional drilled well	209	65	274	74	22	96
Haneti	Functional drilled well	182	58	240	65	19	84
Subtotal	**Functional drilled wells**	**391**	**123**	**514**	**139**	**41**	**180**
Kingale	Non-functional drilled well	243	77	320	86	26	112
Membe	Non-Functional drilled well	234	74	308	83	25	108
Subtotal		**477**	**151**	**628**	**169**	**51**	**220**
Overall total		**868**	**274**	**1142**	**308**	**92**	**400**

The key informants (that is essentially knowledgeable individuals who were in position to provide relevant information, ideas and insights on aspects related to the study subject) were selected using snowball technique. The technique was used because knowledgeable people were few and old; therefore, it was easy to get others after getting the first one.

After interviewing first respondent who was already known, the researcher asked him/her to recommend another respondent considered knowledgeable about the study subject. In this way, 13 key informants were identified and involved in the study. Eight of them were village-based individuals (VEOs, VPAs, POs, Village Chair persons, VWC members), and the other five were from organisations outside the village, but with a stake in drilled wells projects (DWEs, Wami/Ruvu Basin Authority, MAMADO and LVIA).

3.5 Data Collection Methods

In primary data collection, a mixed method (Quali-quantitative) approach proposed by Cresswell (2013); Denzin and Lincoln (2011), Kothari (2004) was applied as follows:

(i) A preliminary survey: A visit was briefly conducted in each of the study villages to get abroad picture of drilled water wells, establish rapport with target communities, make direct observations and ascertain functionality of intended drilled water wells in order to inform the subsequent stages.

(ii) The second round involved 13 key informant interviews (KIIs) and eight FGDs. Focus group discussions is a qualitative technique for data collection. A focus group is a group comprised of individuals with certain characteristics who focus discussions on a given issue or topic (Denzin and Lincoln, 2011; Holland *et al.*, 1998). It consists of a small representative group of people, usually between six and nine in number, who are brought together by a trained moderator (the researcher) to explore attitudes and perceptions, feelings and ideas about a study topic. It is a cost effective method which can enable researcher to collect large amount of information in short time. Owing to group dynamics, this method helps to produce information that could not be generated by asking individual respondents (Bryman, 2006). In this study eight FGDs were conducted, four of them included males, and the rest four FGDs comprised females. Each group

composed of 7-11 purposively selected individuals of different age categories based on their experience in drilled well projects and knowledge of the study village (Appendix 3). During FGD, wealth ranking exercise was carried based on 100 randomly selected households, using wealth indicators in the locality to determine poverty levels that might have influenced sustainability of drilled wells projects (Appendix 4).

(iii) The third round involved HHs' survey whereby quantitative data from CMHHs were collected. Two experienced female enumerators with diploma in rural development were trained for two days on research objectives and data collection to support the researcher in the field during data collection. They also accompanied researcher during the pre-testing of questionnaire in order to get acquainted to the tool. Apart from supervised questionnaire administration, enumerators supported researcher to take notes in FGDs. Female respondents were more comfortable to be interviewed by female enumerators in the study area. Male respondents had no restriction.

Data Collection Instruments

Primary data from community members were collected using a structured questionnaire, a checklist and a researcher's diary. A questionnaire is a data collection instrument consisting of open and close ended questions for the purpose of gathering large amount of information from considerable number of respondents (Creswell, 2013). In this study, the questionnaire had four sections. Section one comprised of questions related to community members personal and situational characteristics. Section two comprised of questions related tor objective one that is factors affecting sustainability of community based drilled wells projects. Section three comprised of questions related to objective two, the extent of stakeholder participation in community-based drilled wells projects Section four

comprised of questions related to objective three that is social, economy, and environmental factor influencing sustainability of community-based drilled wells projects (Appendix 1). The instruments were used to collect information as follows:

(i) A structured questionnaire was prepared and pre-tested in two villages, one with a functional drilled well (Bukulu village-Kondoa DC) and the other one with a non-functional drilled well (Makoja village, Chamwino DC). When collecting data, as a pretesting of questionnaire, twenty HHs were interviewed: ten HHs from each of the two pilot villages. Based on the responses, the questionnaire was revised before going for actual data collection. For easy comprehension, the questionnaire was translated into *Kiswahili* which was the medium of communication in the field. Amongst the questions administered were items of five index summated scales. For each of the items, the respondents were required to give one of the following alternative answers: Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), and Strongly Agree (5) (Appendix1).

(ii) A checklist of items for in-depth interview (is a conversation) of researcher with key informants was used to gather information from 13 KIs and focus group guide was used in discussion to capture information from 8 FGDs (Appendix 2). A checklist is a research tool consisting of themes or questions designed to guide collection of qualitative information through interviews (Kothari, 2004).

(iii) Researcher's diary was used to document direct observations around the drilled wells, water tanks, water points as well as recording data from documentary sources. Observation was also used to crosscheck information collected from other data collection tools, since it does not rely on the willingness or ability of respondents to provide information.

Sources of information include previous research, journals, non-published reports from VEOs' offices, NGOs, Water Department and the internet. Regional Administrative

Secretary (RAS)-Dodoma, Kondoa and Chamwino District Water Departments were also consulted for technical aspects of the drilled wells and guideline on water committee organisations. Collected information provided an insight in to water regulations, capacity building, institutional support and facilitation process. Other sources of information were Wami/Ruvu Basin, *Maji na Maendeleo Dodoma* (MAMADO) and Dodoma water laboratory, which provided information on challenges pertaining to drilled wells projects. The researcher used more than one method in data collection for triangulation purpose, to improve validity and reliability of the findings as recommended by (Denzin and Lincoln, 2011).

3.6 Data Processing and Analysis

3.6.1 Data processing

Technically processing implies editing, coding, classifications and tabulations of collected data so that they are amendable to analysis (Kothari, 2004). It involves preliminary examination of raw data to ensure all detectable errors, inconsistence, non-response and omissions are identified and corrected. The quantitative data collected through completed questionnaire from 400 CMHHs were carefully edited, coded then the data entry into a computer based Program-Statistical Package for Social Sciences (SPSS version 20) followed. The data in the spread sheet were cleaned and stored in a data file with 76 variables, ready for statistical analysis.

In addition, qualitative data from FGDs and KIIs were transformed into a well organised set of notes and then orderly arranged based on common characteristics and attributes as recommended by Denzin and Lincoln (2011); Yin (2013). The data were further summarised manually according to information from functional drilled wells (FDWs) and non-functional drilled wells NFDWs. Information about FDWs and NFDWs was further

classified according to sex of interviewees (Holland *et al.,* 1998; Chambers, 1980). Precaution was taken to ensure the summarised information maintained the original meaning of the statements made. The responses from both questionnaire and KI interviews were double checked and compared to others' responses.

3.6.2 Data analysis

In order to draw inferences and conclusions, the quantitative data collected through questionnaire were subjected to descriptive analysis in order to generate descriptive statistics that enabled the researcher to describe and interpret the data in numerical form. The measurement of sustainability was functionality of drilled wells projects. A series of indicators were used to make comparison between functional drilled wells (FDWs) and non-functional drilled wells (NFDWs). Inferential analysis (non-parametric) tests were employed to test for relationship among variables in order to identify key factors associated with sustainability of drilled wells projects (DWPs). Qualitative data from the researcher's diary and checklist were analysed using "content analysis (CA)"technique. "Content analysis" is a research technique for the objective, systematic, and quantitative description of the manifest content of communication between respondent and researcher. This was carried out by interpreting the data, organising them and identifying the patterns, connections and themes that emerged from various sources. The researcher had to reduce the data set into manageable sets of data through a process of reading and clustering them into sub-themes based on conceptual description of ideas and concepts relevant to objectives of the study. Other information considered to be important for this study is attached (Appendices 4, 5, 6, 7 and 8).

3.6.2.1 Measurement of variables

The main variables which are relevant to the study were measured as follows:

i) Sustainability was measured by asking the respondents whether their drilled wells projects were functional or not. Positive responses indicated functional while negative responses indicated non-functional status.

ii) Initiative process at donor, national level and community levels were measured by seeking the respondents' opinions on ten predetermined indicators e.g. "sustainability assessment carried out, concurrence of stakeholders obtained, source of help identified during planning stage. Initiative process at different levels was inferred from scores provided by CMHHs respondents.

iii) Extent of stakeholder participation in different stages of drilled wells project was determined by soliciting respondents' views on seven indicators e.g. more women were involved in the projects than before, participation of water committees in financial decisions. Extent of participation was inferred from percentages of positive scores by respondents.

iv) Social, economic and environmental factors were measured by soliciting the respondents' opinions on ten predetermined indicators e.g. "users' satisfaction on water services, responsible parties have adequate resources to cover project costs, evidence of positive behaviours related to hygiene". Index summated scale was developed from the scores on each of three (social, economic, and environmental) dimensions.

3.6.2.2 Data analysis by objectives

Factors associated with sustainability of community-based drilled wells projects initiative process

Data analysis for the first objective was based mainly on descriptive statistics including frequencies, percent and cross-tabulations. Qualitative data from KIIs and FGDs were analysed using "content analysis (CA)" technique and summarised according to emerging themes. Rationale of CA is that it has ability link and to analyze primary data embedded in

mixed data collection methods. In order to test for association between variables, inferential analyses were carried out. For that sake, on-parametric analyses (Mann-Whitney U test and Kruskal Wallis-H) were used in testing group medians in the index summated scale developed from the ten opinion statements measuring factors that influence drilled wells projects initiative process. The data for this objective were measured at ordinal level (SD = strongly disagree, D = disagree, N = neutral/undecided, A = Agree, SA = strongly agree) and did not meet normality assumption required for parametric tests.

Extent of stakeholder participation in different stages of selected community-based drilled wells projects

Extent of stakeholder participation in different stages of selected community-based drilled wells projects was measured using an index summated scale developed from seven opinion statements to each of which the answer was Never (0), Limited extent (1), or Great extent (2). One of the statements was "Project committees do participate in project management and financial decisions". The CMHHs who indicated "never" were considered having negative opinion, while those who indicated "great extent" were considered to have positive opinion, and those who indicated "limited extent" were regarded as having neutral opinions towards the extent of stakeholder participation. Qualitative data from KIIs and FGDs were analysed using "content analysis (CA)" technique by breaking them into smallest meaningful units of information and summarised according to emerging themes.

Differences in opinions with regard to sustainability of drilled wells projects by respondents' personal and situational characteristics, social, economic and environmental factors

Social, economic and environmental factors influencing sustainability of community-based drilled wells were measured using an index summated scale, developed from

10statements. The required answers to those statements were: strongly disagree (1), disagree (2), undecided (3), agree (4), and strongly agree (5). One of the statements was "drilled well users are satisfied with service provided and contented to see no changes". The indicators were collapsed into three levels by combining strongly disagree with disagree to represent negative opinion (disagree), agree and strongly agree to represent positive opinion (agree), undecided to represent neutral opinion. Summated scales are often used in survey instruments to probe underlying constructs that the researcher wants to measure. The scale was later collapsed into three levels, namely agree, neutral, and disagree for easy interpretation and presentation (Grimbeek *et al.*, 2005).

In order to test associations among variables, non-parametric tests namely Chi-square, was used at ($p \leq 0.05$) level of significance. Mann-Whitney U test and Kruskal Wallis-H were used to test for significant differences in dependent variables (i.e. scores on the sustainability scale) of two and more than two categories respectively). Mann-Whitney is a non-parametric technique used to test for differences between two independent groups on a continuous measure, while Kruskal-Walis H test allows researchers to compare scores on a continuous variable for three or more groups. It was hypothesized that there was no difference in opinion pertaining to functionality of those drilled wells projects during the study period.

Furthermore, in order to isolate cumulative effect of social, economic and environmental factors, the average scores were calculated using the formula ($\sum x_1 \ldots x_n / n$) where x = scores of each statement or indicator, n= number of indicators measuring each category i.e. of social, economic and environmental factors separately. Then the cumulative scores of each category were subjected to non-parametric tests. Qualitative data from KIIs and FGDs were analysed using "content analysis (CA)" technique and summarised according to emerging themes.

3.7 Ethical Consideration

Any scientific research must be carried out in ethical and responsible manner to enable moral integrity of research, defend and safeguard the interest; rights and confidentiality of respondents (Saunders *et al.*, 2007; Denzin and Lincoln, 2011). Permission for data collection was sought through legitimate processes of obtaining research permit from SUA-Vice Chancellor's Office, then from RAS-Dodoma, District Administrative Secretary (DAS)-Chamwino and Kondoa. Village entry protocol was adhered to by visiting Village Executive Offices (VEO) in the study villages. Respondents were provided with detailed explanation of the research objectives and assured of confidentiality before participating in the study. No names or direct personal identifications were made except numeric identification to facilitate follow-ups. Participants were told the research was to provide an opportunity for them to reflect about the progress of their drilled wells projects and the future action.

3.8 Limitations of the Study

In the process of data collection, two limitations were encountered as follows:

(i) Some respondents were reluctant to cooperate in interviews demanding for monetary compensation for data collected. This tendency was cultivated by experiences on past research studies, whereby interviewees were offered money in exchange for information. In overcoming this challenge, the researcher convinced interviewees to appreciate the focus and importance of the outcome of the research in community livelihoods.

(ii) In some villages, culture and taboos posed some difficulties on interview of female-headed households, especially under polygamous setting to give their opinions freely. To address this, female enumerators were asked to attend such cases.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

This Chapter presents results and discussion of the study findings. The Chapter is organised into four sections and subsections. The four sections are: community members' household heads (CMHHs) characteristics, factors affecting sustainability of community-based drilled wells projects initiative process, extent of stakeholders' participation in various stages of community-based drilled wells projects; and social, economic and environmental factors influencing sustainability of community-based drilled wells projects.

4.1 Community Members Household Head (CMHHs) Respondents' Characteristics

In social sciences research characteristics of respondents have very significant role to play in expressing and giving the responses about the problem been researched. They also help the research to make comparison of various variables. The study sought to establish the characteristics of the respondents, which were under two main categories namely; (i) personal and (ii) situational characteristics as describe hereunder.

4.1.1 CMHHs respondents' personal characteristics

Results on personal characteristics of the CMHHs respondents are presented in Table 3.

(a) Age

It is shown in Table 3 that 61.1% and 55.9% of the CMHHs respondents in both FDWs and NFDWs wells, respectively, fell under economically active working group of 35 to 64 years. The age categories were established based on National Bureau of Statistics (NBS) household budget survey of 2011/12 (NBS, 2014). The age group of 35-64 years is considered as active working group, and hence actively engaged in community-based

development interventions. Moreover, this age group is considered to have reliable and stable income which urgently needed to sustain drilled wells projects. CMHHs in this group are adventurous; tend to move from one place to another on business matters. They tend to have easy access to information and being potential contributors in terms of cash, labour, skills and information required for sustainability of CBDPs in the study area.

Table 3: Percent distribution of CMHHs respondents (n=400) personal characteristics by the status of drilled wells projects

Characteristics	Status of drilled wells		$\chi 2$	Df	P-value
	FDWs CMHHs (n = 180)	NFDWs CMHHs (n = 220)			
Age	**%**	**%**			
18- 34	16.1	24.5			
35 – 64	61.1.7	55.9	4.347ns	2	0.114
65- 90	22.8	19.5			
Sex					
Male	79.4	75.0			
Female	20.6	25.0	1.104 ns	1	0.293
Marital status					
Single	26.7	27.3			
Married	73.3	72.7	0.980 ns	1	0.892
Respondent was born in the project village					
Yes	58.3	68.6			
No	41.7	31.4	4.561*	1	0.033
Education level					
No education	22.8	22.7			
Adult literacy	4.4	5.0			
Std. I-IV	7.2	4.5	10.389 ns	4	0.120
Std. V-VIII	59.4	66.8			
Post primary	6.1	0.9			
Household size					
<5	38.3	44.1			
5-10	57.8	54.1	2.576 ns	2	0.276
>10	3.9	1.8			

Key: ns = Not significant, * = Significant at 0.05. FDWs = Functional drilled wells, NFDWs = Non-functional drilled wells

A quarter (22.8%) and 19.5% of the respondents under FDWs and NFDWs, respectively, were aged above 64 years; this age category was considered to be rich in terms of experience and information regarding CBDPs initiation process.

The study was interested to find out whether functionality status of drilled wells projects was independent of respondents' age group categories. The Chi-square test did not reveal any significant association between the age categories of CMHHs respondents and the status of drilled wells projects at ($p \leq 0.05$). However, the FDWs had a higher proportion (61.1%) of active work age group as compared to NFDWs (55.9%). Based on the African culture, as an individual advance in age he/she is expected to show higher ability in making wise decisions, being responsible to communal assets and showing a sense of maturity (Sproten *et al*., 2010). For that matter, age of beneficiaries plays an important role in sustainability of community-based projects because active age community members have more resources to contribute for development projects than younger ones.

About 22.8% of respondents from FDWs and 19.5% from NFDWs respectively fell under elderly age group. This age group is considered to be rich in terms of information of drilled wells projects initiative process, but it is prone to risk averseness. Risk averseness in economic investments has been found to increase with advanced age (Paulsen *et al.*, 2012). Generally, complex projects such as water projects which require huge investments need to be managed by risk takers' age group. For that matter, active working age group members are expected to be more active in implementation and maintenance of community-based development projects, which in turn influences project sustainability.

(b) Sex of respondents

The results, as presented in Table 3, indicate that, out of the 180 respondents from FDWs, 79.4% were MHHs and 20.6% were FHHs. On the other hand, out of 220 respondents from NFDWs, 75% were MHHs and 25% were FHHs. Female-headed households are often more labour and resource constrained than male-headed households, but these disparities cannot necessarily be attributed to the sex of the household head. The study was

also interested find out whether functionality status of drilled wells projects was independent of respondents' sex status. The Chi-square test did not show any significant association between the sex status of CMHHs respondents and the functional status of drilled wells projects. Nonetheless, sex of the respondent is an important dimension in sustainability of drilled wells projects, especially on decision making (Sanz de Acedo Liarraga *et al.,* 2007). Generally, women are the ones who, in most cases responsible for water collection and they suffer most in case drilled wells projects are not sustainable. Moreover, culturally, men are duty bound to undertake hard tasks such as digging trenches for laying water pipes in drilled wells projects.

(c) Marital status

With regard to marital status of CMHHs, the results in Table 3 reveal that the majority (73%) of the CMHHs respondents in both categories (FDWs and NFDWs) were married couples, while the rest (27%) were separated or divorced including those who were single in the sense of being not yet married and widowed. Married couple's take the advantage of synergy between spouses; hence they have higher likelihoods to be engaged in productive functions and to contribute resources in CBDPs initiatives compared to singles (Stimpson *et al.,* 2012). The study was interested to find out whether functionality status of drilled wells projects was independent of respondents' marital status. Nevertheless, the results showed no significant association between marital status of CMHHs respondents and the status of their drilled wells projects.

(d) Whether respondents were born in the study area

The results in Table 3 show that 58.3% and 68.6% of CMHHs respondents from FDWs and NFDWs respectively were born in the study area. The study was interested to find out whether functionality status of drilled wells projects was independent of respondents' place of domicile. The Chi-square test revealed significant association between

respondents' opinions and their places of birth ($p \leq 0.05$). The longer one stays in a place, the greater the sense of belonging, and the higher the commitment to one's home village (May and Muir, 2014). The household heads that were born and lived in the community tended to have a more sense of belonging and were more concerned with their community wellbeing, including sustainability of development projects for improved livelihoods of their people than those who had recently migrated in.

(f) Respondents' level of education

The distribution of CMHHs respondents by the level of education is presented in Table 3. The results show that the majority (59.4% and 66.8%) of CMHHs from FDWs and NFDWs respectively had attained standard V to VIII, implying primary school level of education. Although Chi-square test did not reveal any significant association between CMHHs respondents' level of education and status of their drilled wells projects, the findings showed that 22.8% and 22.7% of CMHHs in FDWs and NFDWs, respectively, had no chance for formal education. Only 6.1% and 0.9% of CMHHs in FDWs and NFDWs, respectively, had a chance for post primary education. Education does not only equip citizens with basic skills to run their lives and meet challenges of life, but it is also a human right (Mbelle, 2008).

Educated community members are conscious and have higher likelihood to sustain their community development projects than non-educated ones. This observation is contested in a paper written by Sterling (2014) on the central role that learning and education must play in supporting individual and community social change. The higher one goes up on an academic ladder, the more exposure to innovations one is likely to get. Level of education will be reflected on their capability to learn, absorb, analyse and change in different issues, as well as making informed decisions pertaining to their development projects. Education

level of community members, contribute to the continued growth and revitalisation of community. Unfortunately, in Tanzanian context educated elites hardly participate in communally initiated projects directly, except in terms of remittances. Many of elites are not living in rural areas and even the retired ones tend to settle in urban settings.

(g) Household size

Table 3 also shows the distribution of the household size of CMHHs. The majority (57.8% and 54.1%) of CMMHs from FDWs and NFDWs, respectively fell within the medium category of 5 to 10 people per household. Household size consists of the number of persons usually residing in a household and share household expenses ('common' kitchen) (Kamuzora and Mkanta, 2000). The Chi square-test results did not reveal any significant association between CMHHs' size and the status of drilled wells projects. However, Kamuzora and Mkanta (2000) argue that households with a higher number of members tend to have lower poverty levels than those with fewer members, implying that members of large households are prompted to effectively utilise their resources. However, in case there are many dependants in the household, this does not work, as those dependants tend to increase household poverty.

In this study, it was also revealed during focus group discussions that large households demand more water, hence pay for water more than smaller ones. Large households are, therefore, expected to be more sensitive and more concerned with sustainability of water projects than small households. They also have more labour force to be committed in development projects than smaller households.

4.1.2 CMHHs respondents' situational characteristics

The study sought to establish situational characteristics of respondents. It focused on: (i) On-farm activities, namely land ownership, cultivated area and livestock production,

(ii) Off-farm activities in which CMHHs respondents were engaged, and (iii) Involvement of CMHHs respondents in drilled wells projects.

(i) On-farm activities

(a) Land ownership

Inquiry was made on whether the respondents owned the land. Table 4 shows that 55% and 36.6% of CMHHs respondents from FDWs and those under NFDWs respectively, owned the land of less than 2.0 ha.

Table 4: Percent distribution of CMHHs respondents (n=400) situational characteristics by the status of drilled wells projects

Situational Characteristics	Status of drilled wells		χ^2	P-value
	FDWS CMHHS (n = 180)	NFDWS CMHHS (n = 220)		
On-farm activities	**%**	**%**		
Size of land owned in Ha				
<2	55.0	36.6		
2-5	33.3	41.4	21.001***	0.001
>5	11.7	25.0		
Area of land cultivated				
<2	71.7	44.1		
2-5	22.2	40.9	31.072***	0.001
>5	6.1	15.0		
Livestock ownership				
Cattle				
1-5	16.1	10.9	7.519 ns	0.057
6-10	5.6	12.3		
>10	6.7	8.6		
Goats				
1-5	16.7	12.3	4.041 ns	0.257
6-10	12.2	8.2		
>10	8.3	8.2		
Poultry				
1-5	18.3	16.4	4.035 ns	0.258
6-10	13.9	8.2		
>10	7.2	8.2		
Off-farm activities				
Local brew	0.6	0.9		
Business	3.9	1.4	0.476*	0.024
Official employment	21.1	12.3		
Water vending	1.1	0.0		
Political/Religious posts	6.5	5.0		

Key: ns = Not significant, * = Significant at 0.05; ***= Significant at 0.001;
FDWs = Functional drilled wells, NFDWs = Non-functional drilled wells

Contrary to the researcher's expectation, the results showed that a large proportion of CMHHs from NFDWs (44.1%) owned medium land size of 2 to 5 ha as opposed to only 33.1% of CMHHs from FDWs. In the study area, land size is culturally a key indicator for wealth and a proxy for household income. This was revealed in a wealth ranking exercise during the FGDs (Appendix 4). Some land may be rented out to get cash income and some cultivated by the household. Land size as proxy indicator for wealth has connotation to ability of community people to contribute resources towards their drilled wells.

The study was interested to find out whether functionality status of drilled wells projects was independent of respondents' land size categories. The Chi-square test revealed that there was a significant but negative association between CMHHs' land holding and the status of drilled wells projects ($p \leq 0.001$). Land holding was higher in NFDWs as compared to FDWs projects. Explanation for this discrepancy in land holding is that, although, in the NFDWs, one can hold large piece of land, that land is not put into commercial use to generate income that is urgently needed to sustain the drilled wells projects through voluntary contributions and purchase of water. Moreover, according KIs explanations, in NFDWs some members were not ready to contribute towards their drilled wells project because they did not perceive benefits since the projects were frequently not functional. The results in Table 4 therefore, suggest that land holding had no positive relation to functionality of drilled wells.

(b) Cultivated land

With regard to area cultivated, 71.7% and 44.1% of CMHHs from FDWs and NFDWs projects respectively cultivated less than 2.0 ha. The Chi-square test revealed that there was a statistically significant association between CMHHs' cultivated land size and status

of drilled wells projects ($p \leq 0.001$). Discussions from focus groups revealed that land was a vital livelihood asset for food security and survival and one of livelihoods strategies in the study area (Assmo, 1999). Although the results did not show significant difference in opinion between the two categories, majority of respondents owned less than two hectares. Land is where CMHHs generate financial resources needed to sustain the drilled wells projects.

(c) Livestock ownership

The study sought to find out whether the CMHHs owned livestock (Table 4). The livestock owned included cattle, donkeys, sheep, goats, pigs, and poultry. The major categories of livestock owned are presented in Table 4. Less than one-fifth (16.1%) and 10.9% of CMHHs from FDWs and NFDWs, respectively, owned 1 to 5 heads of cattle. Only a small proportion (6.7% and 8.6%) of CMHHs from FDWs and NFDWs respectively, owned large stocks of more than ten heads of cattle. The results imply that the CMHHs under NFDWs were better-off in terms of number of cattle. However, there was no significant association between number of cattle owned by CMHHs and functional status of drilled wells projects. In case of CMHHs' ownership of goats, 16.7% and 12.3%of CMHHs from FDWs and NFDWs projects, respectively, owned 1 to 5 goats. However, there was no significant association between number of goats owned by CMHHs and status of drilled wells projects. Lack of association does not refute the fact that both humans and livestock need water to survive. If the drilled well is not functioning the people will look for alternative sources in the neighbouring villages.

With respect to poultry ownership, a small proportion (18.3% and 16.4%) of CMHHs from FDWs and NFDWs projects, respectively, owned 1 to 5units of poultry. Only 7.2%

and 8.2% of CMHHs from FDWs and NFDWs, respectively, owned over 10 units of poultry. Nevertheless, there was no significant association between the numbers of poultry owned by CMHHs and status of drilled wells projects. According to the results from FGDs, poultry ownership is curtailed by frequent outbreak of new castle disease (NCD).

Drawing from explanations during FGDs, cattle owners are considered a wealthy group and accorded special honour because of their promptness to contribute for repairs of the drilled wells projects for the sake of their cattle. There was evidence at Haneti village that, in extreme cases, cattle-rich CMHHs were willing to incur expenses to repair the drilled wells and sometimes to dig traditional wells, which serve their livestock as well as other community members. One thing to note is that their motive is not to serve community but to rescue their livestock.

(ii) Off-farm activities

The study sought to find out the types of off-farm activities the CMHHs respondents were engaged in. The results presented in Table 4 show that0.6% and 0.9% of CMHHs from FDWs and NFDWs respectively were involved in local brew business. Exactly 21.1% and 12.3% of CMHHs from FDWs and NFDWs respectively were employed in civil service, and only 1.1% of CMHHs from FDWs indicated water-vending as their off-farm activity. The Chi-square test revealed that there was statistically significant association between CMHHs' type of off-farm activity and status of drilled wells projects at ($p \leq 0.05$).

Explanations from FGDs indicated that off-farm activities were carried out to supplement household income. The type of occupation of CMHHs determines the level of income and the ability to pay for water services and other contributions. Economic welfare of

community is measured by productive employment of its members both in agrarian and non-agrarian sectors. In addition, Lema *et al*. (2014) pointed out that, off-farm activities help to a great extent in reducing income insecurity in rural areas of Tanzania, suggesting that there are important complementarities between on-farm and off-farm income.

(iii) Participation of CMHHS respondents in drilled wells projects

The study sought to find out participation of CMHHs respondents in the drilled wells projects. The aspects which were dealt with in drilled wells projects were: whether the projects were implemented more than two years without donor support, whether CMHHs respondents were involved in those projects and evidence of achieving all project objectives. Others were whether project benefits covered at least 50% of the population, whether the project was implemented by local institutions at local authority level, and whether at least 75% of the facilities were in operational order.

The results presented in Table 5 show that 100% of CMHHs respondents in both FDWs and NFDWs projects had positive opinion that the four drilled wells projects had been in operation for more than two years without donor support. All CMHHs respondents admitted that they had been involved in the drilled wells in different capacities and that all the four projects were implemented by local institutions (Public Works Department or District Water Department) as a communal resource at the local level (village).

Confirming their involvement, explanations from FGDs, revealed that CMHHs respondents in FDWs used water for domestic purposes, drenching their animals, construction, general sanitation in schools and mosques; some were private operators (POs) and some were involved in water vending as a source of income. In both FDWs and NFDWs, some CMHHs respondents were members of VWCs.

Table 5: Percent distribution of CMHHs respondents (n=400) opinions in their involvement in drilled wells projects

Statement	Status of drilled wells			
	FDWs		NFDWs	
	Haneti (n=84) %	Bereko (n=96) %	Membe (n=108) %	Kingale (n=112) %
• Implemented more than two years without donor support	100	100	100	100.0
• CMHHs respondent invol	100	100	100	100.0
• There is evidence of achieving all project objectives	95.2	82.3	0.0	0.0
• Benefit cover at least 50% of the population	96.4	81.2	0.0	0.0
• Implemented by local institution at local level	100	100	100	100.0
• Have at least 75% of the facilities in operational order	97.6	89.6	0.0	0.0

With respect to achieving all project objectives, the majority of CMHHs from FDWs (Haneti 95.2% and Bereko 82.3%) had positive opinions, as opposed to those under NFDWs (Membe and Kingale, 0.0%, respectively). Whether drilled well projects had benefit covering at least 50% of the population, the results showed that the majority of CMHHs from FDWs (Haneti 96.4% and Bereko 81.2%) had positive opinions as compared to those from NFDWs (Membe and Kingale, 0.0% respectively). The difference in opinion is that NFDW were not benefiting to water service during the study time. Their very low opinion could be prompted by expectations from outside to keep their drilled well running.

Responding to whether the drilled wells projects had at least 75% of the facilities (engine house, pump, engine, water pipe network, water tanks, gate valves, water points, and water taps) in operational order, the results in Table 5 show that the majority of CMHHs from FDWs (Haneti 97.6% and Bereko 89.6%) had positive opinions as opposed to those under

NFDWs (Membe and Kingale) which were not operating. It was noted that all the four projects were aged since the infrastructure had undergone substantial depreciation. All projects were using out dated mono pumps which are vulnerable to corrosion due to salinity, hence frequent breakdowns. Details of each drilled well project are presented in Appendix 5. The water point mapping data base revealed that functional status drilled wells projects was a persistent problem across the LGAs in Dodoma region. For instance, according to Taylor (2009), the rate of non-functional at national level was 46% in 2009. For Dodoma region, specifically, the point mapping data base showed 44.9% in 2013, implying very slight improvement by only 1.1% compared to the national figure (Appendix 8). Among the rural LGAs of Dodoma region, Chamwino DC had a higher rate of non-functional water points (51.15%), followed by Kondoa (38.70%). The differences between districts could be due to many factors including topography features and attitude of people. Kondoa hills offer some opportunities for surface water especially during the rainy season as opposed to Chamwino people who were solely reliant on ground water. Attitude wise researchers' personal experience shows that Kondoa people are proactive in collective actions compared to Chamwino.

During the study visit, Kingale project had been out of operation for the previous one year, while Membe had been out of order from the previous three months. According to KII from district water department, Membe drilled well project was habitually non-functional, as it took some time before the community was able to meet maintenance costs in case of break down. It was observed that Membe community members had an alternative source of free water (Membe stream) located 5 km away on the Dabalo ranges from which the village derives the name. Livestock are also drenched from the stream to avoid associated costs. Moreover, all the four drilled well projects were beyond the designed lifespan of more than 25 years. Therefore, the water wells infrastructure was quite old, warranting

replacement in order to ensure sustainability of water services to beneficiaries. Only Haneti community had demonstrated capability to replace aging machine and expansion of water pipes to emerging hamlets.

During the time of visit, it was reported that Membe village was going to receive a new drilled well project with support from the World Bank. The new project would involve sophisticated submersible water pump and wider coverage of water points. Unfortunately, peoples' capability, experience, commitment, and voluntarism as well a self-help spirit, need for communal asset management were quite low. For more than three years, the community members were able to mobilise only TZS 18 000 000 out of TZS 22 000 000 required as community's contribution toward the promised World Bank project. This situation created doubts as to whether the new projects would be sustainable because the community had not yet developed sufficient self-organising capabilities, experience and willingness to contribute for communal projects.

As it is indicated in Table 5, there were no differences of opinions between respondents from the FDWs and NFDWs on whether the projects had been implemented for more than two years. The results showed that CMHHs respondents were engaged in project activities in one way or another and that are recognised by local institutions at local level (normally administrative village).

4.2 Factors Affecting Sustainability of Community-based Drilled Wells Projects

Initiative Process

The first objective of the study was to identify factors affecting sustainability of the community-based drilled wells projects initiative process. This measures the degree to which community members felt responsible for identifying their felt problem and felt need, planning and initiating the project by themselves, as opposed to being initiated by the donor or government. The planning stage is crucial for sustainability of any

community based project in the subsequent stages of implementation and post implementation that is when donor has withdrawn. The main indicators used for comparison between FDWs and NFDWs in this objective were: whether the local sustainability assessment was conducted, stakeholders' concurrence obtained, local sustainability champion designated and the vision created during project initiation stage. Others were whether a roadmap for reaching the vision was developed, sustainability indicators were developed, sustainability was incorporated into local policy, sources of help were identified, the project was carried out, and progress was checked (Appendix 1, Question 2).

Those indicators were designed to compare between the FDWs and NFDWs projects. The results presented in Table 6 show that, on average, the CMHHS from FDWs (Haneti,56.78% and Bereko, 42.39%) were more optimistic on sustainability of the initiative processes of their drilled wells as compared to those under NFDWs (Membe, 28.79% and Kingale 8.05%). However, with exception of Haneti drilled well project, the scores were generally low. The implication for these results is that, possibly, the interveners did not consistently abide by important indicators for community-based drilled wells projects initiative process (refer to the list of opinion statements) which serves as proxy for sustainability indicators in Table 6).

Table 6: Percent distribution of CMHHs respondents' (n=400) opinions on factors affecting sustainability of community-based project initiative process by status of drilled wells

Opinion statement	Status of drilled wells			
	FDWs		NFDWs	
	Haneti (n=84) Agree %	Bereko (n=96) Agree %	Membe (n=108) Agree %	Kingale (n=112) Agree %
• Local sustainability assessment conducted	64.3	55.2	7.4	1.8
• Stakeholders' concurrence obtained	70.2	58.3	26.9	0.9
• Local sustainability champion designated	63.1	44.8	29.6	2.7
• A vision created	52.4	32.3	23.1	3.6
• Roadmap for reaching the vision developed	52.4	36.5	25.9	2.7
• Sustainability indicators developed	61.9	33.3	21.3	1.8
• Sustainability incorporated into local policy	45.2	35.4	25.9	2.7
• Sources of help identified	41.7	32.3	29.6	3.6
• The project carried out	69	62.5	60.2	54.5
• Progress checked	47.6	33.3	38	6.2
Average	**56.78**	**42.39**	**28.79**	**8.05**

Key: FDWs = Functional drilled wells, NFDWs = Non-functional drilled wells

4.2.1 Local sustainability assessment conducted

It is of paramount importance to focus project sustainability of drilled well projects right from design stage. According to the findings presented in Table 6, the majority (Haneti, 64.3% and Bereko, 55.2%) of CMHHs respondents from FDWs had positive opinions that local sustainability assessment was conducted during the drilled wells projects initiative process as compared to those from NFDWs (Membe, 7.4% and Kingale, 1.8%). The findings above are supported by results from FGDs that showed that in FDWs village governments in collaboration with surveyors would undertake basic baseline survey to collect information that could help in identifying key goal and provide basis for measuring success of the projects. Local sustainability assessment is the first and most important step

to ensure sustainable participatory development process of the community. Local sustainability assessment entails establishing the existing reality on factors which would influence sustainability of intended CBDP. It helps to understand what people really need, as well as what people want to tackle by themselves without help from outside. It is important to understand whether community have enough capacity and necessary experience to pursue their initiative. Based on information from KIIs in the FDWs, the aim of sustainability assessment was to identify concrete felt problems, felt needs, issues and concerns which community members had and were determined to take action on using the existing knowledge, attitude of people, local skills and people's experience (KASE).

The issues and concerns of sustainability assessment include social, political, economic, cultural and environmental (SPECE) aspects. Also, sustainability assessment helps the interveners to grasp the capacity and potentiality of community to overcome their challenges and to realize their needs and hence improved livelihoods of the people and sustainability of their projects. Sharma and Ohama (2007) suggested local sustainability assessment to include awareness creation, organisation strengthening, capability building, and institutional networking potentials that could be mobilised to offset existing obstacles in order to attain the objectives of intended projects.

In addition, peoples' past-experience in trying to overcome their problems needs to be described and analysed by the people themselves in terms of capability for communal resource management and utilisation, organisation formation and strengthening, norm formation, compliance and linkage to outer society. The results from sustainability assessment are useful for communities to reflect, understand themselves and become conscious of their local contexts. People must understand the direct between their felt problems and benefits to be realised if their felt needs is to be addressed.

Consciousness of existing reality would serve as a community motivator for change. That is why it is logical to emphasise on sustainability assessment from the project designing phase. Unfortunately, the results from this study suggest that this important step was possibly overlooked in drilled wells projects initiative process, especially among the NFDWs projects. It might have been out of ignorance of facilitators and project designers.

The scores on this indicator were lowest in Kingale because the village was not a natural one where collective action took place easily, but a newly established administrative village under the *Operation Villagisation* of 1973. The residents moved in from different locations within Kondoa hills; hence they had not developed sufficient values such as mutual understanding, trust, volunteerism, self-help spirit and unity among the community members which are pre-requisites for collective action including capacity to undertake local context analysis for sustainability of intended communal projects. It requires many years of working together in collective actions such as communally owned projects before the community can develop those characteristics depending on the degree of facilitation by community facilitators. Results from FGDs showed that during the operation *villagisation,* there was not sufficient time to conduct local sustainability assessment, team building of community because the pressing need during that time was water. Hence, drilled wells would be hurriedly constructed in 1976 by government without baseline survey hence taking sustainability for granted.

These results therefore imply that prevailing local contexts in relation to their proposed drilled wells projects were not thoroughly examined. Sustainability assessment helps to grasp functional and structural capacity of community in development and collective actions which form a base for participatory development. During sustainability assessment, it is the best moment to capture "self-organizing capability of a local community" which should be fully recognised by both community people and interveners as the potentiality of a community, in local development and service delivery. As applied

in this thesis, self-organizing capability (SOC) is the capability to spontaneously reorganize the existing pattern of resource acquisition, utilization and management into a new alternative one so as to maintain the sustainable basis for daily activities, by way of selectively accommodating specific changing factors (Sharma and Ohama, 2007). It is also the capability that is historically moulded and resultant from the surrounding social environment and conditions of a local society that encompasses the local community concerned. It is also an important step to identify the peoples' priorities, knowledge, experiences, skills and capabilities that can be mobilised to overcome challenges in order to achieve the goals of proposed community projects.

Local sustainability assessment helps to collect baseline information which provides a yardstick for gauging progress during project implementation and post implementation phase (FAO, 2013). Moreover, sustainability assessment provides forums to reflect on results of the analysis into subsequent facilitation and community planning process. During sustainability assessment, peoples' efforts can be realised in terms of community initiatives (CIs); that is what people want and are ready to do by themselves. This is a fundamental aspect demonstrating how community is endogenously determined to act in addressing their felt needs.

Local sustainability assessment also helps to understand what other stakeholders could do or support to community effort because what the community members want is not always what they can do by themselves. Drilled wells projects are examples of such complex and expensive projects which require external support. However, for sustainable initiative process, external stakeholders need to build on what people have, starting from what the people are ready to do and backing-up their existing dynamics. Sustainability assessment also helps to reveal cultural barriers and enablers of proposed interventions. For instance, in some communities, women would prefer to have a distant water source, so that they can

have time to go out to fetch water as well as socialisation. Fortunately, no serious cultural issue was observed in the study area. In Membe village women admitted that it is a tiresome duty to fetch water from Membe stream, nevertheless it was a good opportunity to socialises with other women. In Kingale (Muslim dominated) community women had limited mobility and minimal participation in public meetings due to obstacles such as farming, reproductive roles and hindrance by their husbands. Water fetching from distant sources was mostly being done by male water-vendors using bicycles and tricycles.

4.2.2 Stakeholders' concurrence obtained

As applied to this thesis, stakeholders' concurrence refers to agreement between community members and agencies with stake in drilled wells projects (Appendix 6). The designated stakeholders for the drilled wells projects were at donor, national level, district level and beneficiary level The findings in Table 6 show that the majority (Haneti, 70.2.3% and Bereko, 58.3%) of CMHHs respondents from FDWs had positive opinions that there were stakeholders' concurrence in the process of initiating drilled wells projects as compared to those from NFDWs (Membe, 26.9% and Kingale, 2.7%). The results suggest that, in FDWs, there was effective stakeholder concurrence as compared to NFDWs. For the initiative process of a drilled well to be sustainable, stakeholders had to concur and make concrete agreements on peoples' priorities, planning process, resource allocation, geographical and social location of projects, types of technologies, spare parts supply, water quality testing, and considerations for norms and cultural differences. These are important elements that need to be addressed simultaneously during planning stage to avoid future conflicts (Ohama, 2002).

Since the roles and functions of each stakeholder were different from each other, concurrence would provide an effective platform for reinforcing consciousness among

stakeholders (Akhmouch and Clavreul, 2016). Through concurrence, district and community facilitators get integrated and familiarise with target community members and gain better understanding of community's situation. Concurrence would provide a forum for stakeholders to freely reflect on results of the local sustainability assessment into community facilitation and community planning process as it is urged in Bertil (2001) that a sustainability need a balanced view of development as freedom of people. Reflection helps in further understanding of diverse social contexts and how to use its results as a base of effective community facilitation and to generate new or strengthening of existing community initiatives.

Explanations from FGDs and KIIs across the four drilled well projects revealed that community members agreed to contribute labour for digging trenches, which is contribution in-kind. According to village-based KIIs, there was no cash contribution during that time, as people were paying a variety of taxes including development levy, livestock and bicycle levy. Currently, these taxes have been scraped off and are considered as nuisance taxes. It was, therefore, rational during that time to expect government alone to undertake capital investment in drilled well projects for water service delivery without direct financial contributions from benefiting community members. However, this was contrary to the endogenous development theory as it suppresses self-help, voluntarism spirit and limits local autonomy of the target villages (Sharma and Ohama, 2007).

Apart from in-kind contribution, cash contributions by the beneficiaries tend to instil a sense of ownership of community-based development projects (URT, 2002). The community members should take much of the autonomy of the projects as they are the ultimate beneficiaries. This does not limit the community from interacting with external financial institutions and donors to cover some resources, specialised skills, improved

technology and experiences which are not locally available or are beyond the reach of community. External support can be required so as to minimize the risks associated with the project that may jeopardise its sustainability.

The differences observed in these results between FDWs and NFDWs are partly because of varying degrees of stakeholders' concurrence in each project and also limited facilitation efforts in NFDWs. For instance, for the case of Haneti drilled well project, one of the key informants was proud of best practice in their village and had said this:

> *"In 1958, when that white man and his team of water surveyors came to Haneti, we, the beneficiaries, were given a chance to make suggestions with regard to drilling sites using our indigenous technical knowledge (ITK). The Chief summoned the elders and cattle-rich men for consultation with respect to drilling sites that would yield safe and clean water. The need for concurrence was due to previous experiences whereby some community members drilled shallow wells but the water was salty and some wells were located along migration route hence vulnerable to destruction by wild animals passing across the village. One of our elders (the late Mzee Yahaya), after three days of meditation, he suggested five points with possibility of getting clean and safe water. The good news is that concurrence was reached, and the surveyors discovered water on the third point among the five suggestions and that is where our drilled well is located even today. It was a joyful moment; women danced; we offered chickens and goats to the surveyors and drillers. We inaugurated our drilled well project with traditional rituals, involving all village members. Every village member expressed commitment to safeguard the project."*
> **Source:** KII- Haneti village (2013).Translated from Kiswahi to English by the Author

On the contrary, the story from Kingale drilled well project was totally opposite. The key informants and female FGD members were complaining that there was no consensus with regard to drilling site as narrated below:

"When water surveyors came, we suggested several points downstream using our experiences. Surveyors, using their equipment, located water in three sites. One point was upstream, and the other two points down stream. In our opinions, downstream points could yield water with less salinity. Our village chairman, during that time, maliciously convinced the drilling team to drill at the upstream point located at Msui his home hamlet. Although the drilled well has plenty of water, that particular location was known to have salty rocks where our ancestors used to collect salt. As a result, water from that drilled well is not useful for domestic purpose; hence we have to buy water from neighbouring villages of Tampori and Chemichemi whose drilled wells are located downstream, along

River Bubu Valley". **Source:** KII- Kingale village (2013). Translated from Kiswahi to English by the Author

The controversy observed between the two projects suggests that, although scientific knowledge is necessary, local peoples' knowledge and experiences have to be respected and valued. Consensus must be reached in order to enhance sustainability of initiative process of community projects.

4.2.3 Local sustainability champion designated

It was expected that for drilled well projects to be successful, target community would appoint a distinguished development-oriented individual or core group of local leaders who seek to transform drilled wells projects into sustainable communal enterprises for sustainable development. Therefore, the study sought to establish whether local sustainability champion was designated during the drilled wells projects initiation process. The results showed that CMHHs respondents from FDWs (Haneti 63.3% and Bereko 44.8%) and NFDWs (Membe 29.6% and Kingale 2.7%) had positive opinions that local sustainability champion was designated during the drilled wells projects initiation process. Except for the Haneti drilled well project, the results did not provide strong evidence that local champions were designated as the projects were designed, implemented and operated by the government through District Water Departments.

It is logical that, for communal projects to be sustainable, communities need to appoint visionary, trust worthy, patriotic individuals, a committee, a task force or an organisation to become champion, caretaker or guide to stimulate changes that would ensure sustainability of the community projects. This is in line with endogenous development theory that peoples themselves should steer their development process (Hammarskjöld, 1977; Kandie, 2001; Nkonya, 2008). Selection of project champion by people themselves promotes greater collective confidence by emphasizing the potential power within the

people to effect social change. Explanations from FGDs and KIIs indicate that village governments would be responsible mainly for security of drilled well projects. Village pumps attendants (VPAs) would be employed by the government for routine maintenance of drilled wells projects and that Water Technicians from Water Departments from the LGAs were responsible for all technical matters; no local artisans were would be recruited. Water service would be free for all; hence there would be no water user fees collection and management of water funds by community which would demand better self-organising capability. However, major changes occurred during structural adjustment Programmes (SAP) in the late 1980s.

Following SAPs, in 1995, all operational responsibilities of drilled wells were rapidly decentralised to village governments, and village water committees (VWCs) became responsible for routine management of the wells. Given the importance of the water resource to communities, transparent and effective management were very important aspects, but very little effort was made in this aspect. It was observed in a study by Water Aid (2009) that, under a decentralised system, champions succumbed to managerial and financial crisis, leading to frequent reshuffle of VWCs and adoption of private operators (POs) system.

The challenges above are a result of weakness in community organisation since there was not sufficient organisational capability building before decentralisation of drilled wells. Sharma and Ohama (2007) argued that, for sustainability purposes, it is not a mere presence of champion or an organisation that matters, but the strength of that champion or organisation. Unless common resources such as drilled well projects are managed by strong organisations, they tend to be misused, mismanaged and ultimately rendered non-sustainable.

4.2.4 Drilled well project vision created

During planning stage creation of realistic, project specific and achievable vision is crucial for sustainability of any community based project. For that sake, the study sought to establish whether a project vision was created during project initiation process. The results in Table 6 show that CMHHs respondents from FDWs (Haneti, 52.4% and Bereko, 32.3%) and NFDWs (Membe, 23.1% and Kingale, 3.6%) had positive opinions that vision was created during drilled wells projects initiation process. With exception of Haneti drilled well, the results indicated weak opinions, suggesting that possibly the beneficiaries were not sufficiently facilitated to come up with the project vision. However, whether the vision was there or not water is a basic necessity and human right. Of course, visioning helps the community to create alternative idea and they could vision to replicate drilled well to several others places say to all hamlets or to use experience from drilled well for creating other projects.

Failure of community to have their own projects development vision was contrary to Tanzania Development Vision 2025, that a vision is a vehicle of hope and an inspiration for motivating the people to work harder for the betterment of their livelihood and for prosperity (URT, 2000a). A common vision would provide direction of target community in relation to their own project, as it addresses the purpose, expected outcome or services and values of target community. Creation of a realistic, achievable vision is vital for sustainability of initiative process of any CBDP.

Explanations from KIIs and FGDs revealed that, when most of these projects were initiated (1958-1976), there were not strong collective actions among community members in form of neighbourhood or producer groups that could bring them together, to reason, plan and address the future collectively. So long as there are communal resources in place

(drilled well projects), it was imperative for community members to create a vision that would inspire and motivate them for the rest of life span of drilled wells projects. A good, community vision would help to orient community towards cognisant and operational norms in pursue of their broader long-term goals. The results from this study suggest that, with exception of Haneti community, the rest had no vision to be pursued beyond the drilled wells projects. That is why there was very little effort to utilise surplus generated from the project to expand their water system and initiate activities beyond the water service delivery. This discrepancy was a result of lack of effective facilitation of community in order to think big and aim high.

4.2.5 Roadmap for reaching the vision developed

In order to fulfil the vision created during project design stage, there was need to develop a roadmap that would lead the community members to realise the vision for their drilled well projects. In that line of thinking, the study sought to establish whether a roadmap for reaching that vision was created during the project initiation process. The results in Table 6 show that CMHHs respondents from FDWs (Haneti, 52.4% and Bereko, 36.5%) and NFDWs (Membe 25.9% and Kingale 2.7%) had positive opinions that a roadmap for reaching the vision was developed during the process of initiating drilled wells projects. However, except for Haneti drilled well project, the results indicated varying and weak opinions that did not provide strong evidence that roadmaps for reaching the drilled wells projects vision were created in drilled wells projects initiation process. According to KII from Haneti village, community members, under the leadership of their local Chief, had determined how to manage the project using their previous experiences of hand dug boreholes of up to 15 m deep. This experience provides a glimpse as to how Haneti community members would have been able to sustain their project since 1958.

In order to fulfil the vision created, there was a need to develop roadmap that would lead beneficiaries to achieve the vision for a specific drilled well project. Roadmap helps to see if people can solve problems anticipated or achieve their vision by themselves, by looking at available resources and people's experience in collective actions which is a kind of spontaneous CIs.

The results in Table 6 suggest that community members at Bereko, Membe and Kingale villages had no short term and long-term strategies to achieve their vision. This implies that there was a need for beneficiaries to collaborate with other stakeholders to re-plan and come up with roadmap to achieve their vision as far as the drilled wells projects are concerned. For instance, although Kingale Community is more vulnerable due to salinity problem, they had not taken any initiative that could convince donors to plan for a new drilled well. They had no balance in their bank account as lack of roadmap made the community to be dependent on outsiders' mercy.

4.2.6 Sustainability indicators developed

The study further sought to determine if sustainability indicators were developed during the drilled wells projects planning stage (Table 6). The result showed that CMHHs respondents from FDWs (Haneti, 61.9% and Bereko, 33.3%) and NFDWs (Membe, 21.3% and Kingale, 1.8%) had positive opinions that sustainability indicators would be developed before drilled wells projects had been initiated. Except for Haneti village drilled well project, the scores were weak, implying that the beneficiaries of drilled wells projects had no objectively verifiable indicators to measure achievements of their expectations from the drilled wells projects. It was imperative to set both qualitative and quantitative indicators such as positive change of community hygiene and sanitation behaviour, change in water borne disease cases, degree of transparency in water revenue, compliance to water use

regulations, voluntarism of VWCs, volume of water pumped per day, volume of water utilised per household per day, water revenue collection per month, balance in bank account for expansion purposes, and change in number of local artisans.

Logically, once there is vision and a roadmap, the next step is the formulation of indicators which the community will use to measure the development of their drilled wells projects (Howlett and Nagu, 1997). Unless there are indicators, it is difficult to assess progress and to identify areas of weakness that need to be fixed for the sake of sustainability of their projects. The results imply the need for further empowering community to set their own project indicators and use them to monitor the achievements, reflect on changes and make changes without delay to ensure sustainability.

4.2.7 Sustainability incorporated into the local policy

In order to have sustainable drilled well projects it was anticipated that local policy barriers would be removed and policy incentives created that would stimulate positive changes to sustain their drilled wells projects. With regard to whether the sustainability was incorporated into the local policy (bylaws and water use regulations), the results are presented in Table 6. The results show that a small proportion of CMHHs respondents from FDWs (Haneti, 45.2% and Bereko, 35.4%) and NFDWs (Membe, 25.9% and Kingale, 2.7%) had positive opinions that sustainability was incorporated into the local policy before drilled wells projects were initiated. The low scores in both functional and non-functional drilled wells projects imply that the local policy barriers and incentives were not considered during drilled wells project initiation phase. Incorporation in local policy issues such as minimum interferences with water funds, formation of strong organisation to run water projects and strict norms and compliance to project related by-laws would help to sustain the drilled wells projects right from the initiation phase (URT,

2002). The result has revealed that community rarely incorporated sustainability policy into their development project. Again, this was a result of ineffective facilitation of community. Interveners in CBDPs need to ensure that sustainability has been integrated into local policy.

4.2.8 Sources of help identified

As an important element for sustainable project initiation, community was expected to identify and establish link with internal and external agencies that deemed necessary in implementing its sustainable roadmap of drilled wells projects. In determining whether sources of help were identified during the project initiation, the results are presented in Table 6 indicate that CMHHs respondents from FDWs (Haneti, 41.7% and Bereko, 32.3%) and NFDWs (Membe, 29.6% and Kingale 3.6%) had positive opinions that sources of help were identified during project planning stage. However, the scores were low across the projects implying that the community did not take trouble to identify development oriented individuals, organisations or institutions that could be of any help in case a need arose to pursue their sustainable roadmap. Suzuki (2014) insists on the need for continuous assistance and institutional support systems at local level to enhance sustainability of emerging projects.

External agencies and institutions are expected to offer technical advice and support and to link community with donors, spare parts markets, financial institutions, research centres, training and water laboratories, water regulatory authority and other important organisations (Sharma and Ohama, 2007). Both private and public sectors are potential partners to improve water service delivery and eventual sustainability of the drilled wells projects. It is no wonder that Haneti had more optimistic scores. According to KII, Haneti village government, along with water committee, had had a chance to visit successful

drilled wells projects in Mpwapwa district; hence they were exposed to best practices through horizontal-learning process. Horizontal-learning takes place when a curious group of learners from one development project visits another group, which is of the level, say a water user association, to exchange ideas. This has positive effect on sustainability of development projects. As a result of this exposure trip they adopted the private operator system as they observed at Mpwapwa.

By chance, Haneti was a spontaneously emerging natural village located along the Dodoma-Babati highway. It is endowed by hosting a Division, and Ward headquarters hence community is linked to local administration at all levels. In the village, there are reserves of gemstones (green tourmaline and emerald), large scale maize farming opportunities and is a famous business centre which attracts visitors and government officials throughout the region hence networking can take place to provide help in case of need. However, in all the four drilled wells projects, the skills of institutional-networking were lacking. This is due to poor quality of facilitators and district water department officials. It was learned from KIs that procurement of spare parts is mediated by district technicians, in that way they suppress the growth of community's capability to network with local markets and other helpful institutions in the outer society. It is the role of district, ward and village facilitators to provide networking capabilities to local organisation leaders (VWCs). By so doing, they empower project organisation, hence minimising dependency and ultimately enhancing sustainability of drilled wells projects. More efforts should be made to engage local level actors in the drilled wells projects and ensure that communities know where they can go for help in case they face a problem that is beyond their capability.

4.2.9 The project carried out

Right from design stage, in order to ensure that drilled wells projects would be implemented sustainably it was indispensable to establish people's willingness, confidence and commitment to carry out their envisioned projects by themselves or with support from the government or other partners. Therefore, study sought to find out whether the stakeholder had clear picture of how the drilled wells projects would be carried out across the study villages. The result under Table 6 shows that the majority of CMHHs respondents from FDWs (Haneti, 69% and Bereko, 62%) and NFDWs (Membe, 60.2% and Kingale, 54.5%) had positive opinions hence were generally satisfied with the way their drilled wells projects were carried out. The results imply that in all four drilled wells community members would start to realise initial success by implementing their projects. This would create sense of responsibility among community members.

4.2.10 Progress checked

By using the project indicators developed during design stage it was anticipated that community members would undertake regular evaluation of their drilled wells projects and make necessary adjustments. The results presented in Table 6 show that only a small fraction of CMHHs respondents from FDWs (Haneti, 47.6% and Bereko, 33.2%) and NFDWs (Membe, 38% and Kingale, 6.2%) had positive opinions that progress of the projects was checked. The results suggest that there were no serious project check-ups by community. This is because there was no participatory evaluation system in place; leave alone the fact that communities had no indicator or analytical frame to measure the progress of their projects. Under normal circumstances, it is assumed that beneficiaries would undertake continuous monitoring and periodical evaluation of their drilled wells projects; make reflections and draw lessons learnt before making necessary adjustments (Toledano, 2002). According to FGDs across the study villages, before 1995 there was no

regular monitoring and evaluation (M&E) of projects as recommended in literature by Howlett and Nagu (1997); Kay (2000). Helleiner (2002) is of opinion that local ownership is enhanced through performance monitoring because that is when reflection and actions (*praxis*) concept is internalised by community members.

Results from KIIs revealed that even after decentralisation of the drilled wells projects, the beneficiaries did not receive sufficient capacity building on M&E. This was caused by limited number of qualified facilitators to capacitate the community. Unless community members have capacity for M&E and there is room for community members to analyse and reflect on the outcome of their projects, it is not easy to manage projects sustainably. This implies that there is a need to develop M&E plan and proper project indicators which would help the community accompanied by facilitators to monitor and assess their projects on a regular basis and make adjustments accordingly. Moreover, this situation calls for LGAs to set up not only an effective participatory M&E system, but platform for continuous practice, action and reflection (*praxis*) on their collective activities in the study villages (Cho *et al.*, 2013). Experience gained from drilled wells projects could be used to initiate other projects aimed at solving community problems. Therefore, deliberate social context analyses including; people's capabilities, norms, local resources, linkages with external organisations and power relations within communities are required in design of appropriate and sustainable projects that are able to promote active participation of stakeholders (Chambers, 2005; Sharma and Ohama, 2007).

Beside the ten sustainability indicators discussed in subsection 4.2.1 to 4.2.10, inferential analyses were carried out to determine other factors that might be associated with respondents' opinions pertaining to initiative process of drilled wells projects. Hence, inferential analysis was carried out to determine associations between selected variables

and respondents' opinions about sustainability of drilled wells projects initiative process. The selected variables for inferential analysis included personal characteristics i.e. education levels, age categories, household size, marital status, sex of respondents and wealth categories. Others were situational characteristics including village and district of study.

An index summated scale was generated from 10 statements measuring factors affecting sustainability of drilled wells initiative process, at scale of 1 to 5 to measure opinions about sustainability of drilled wells projects (Appendix 1 question 2). Non-parametric tests namely Mann-Whitney U test and Kruskal-Wallis H Test were used to determine if there was any statistically significant difference between selected variables and CMHHs respondents' opinions with regard to sustainability of drilled wells projects initiative process. The non-parametric tests were used because the dependent variable did not meet normality assumption that is required in parametric tests. The independent variables were measured at nominal and ordinal levels. For that matter, non-parametric analysis was appropriate in testing group medians in the index summated scale developed from the ten statements measuring factors that influence drilled wells projects initiative process.

Mann-Whitney is a non-parametric technique used to test for differences between two independent groups on a continuous measure, while Kruskal-Walis H test allows researchers to compare scores on a continuous variable for three or more groups. The results in Table 7 show comparison of CMHHs' opinions with regard to sustainability of drilled wells projects initiative process (measured by mean ranks) by their education levels, age groups, marital status, household size, sex category, village of residence, district of residence, and wealth category.

Table 7: Comparison of CMHHs' respondents' opinions on sustainability of initiative process of drilled wells projects by their personal and situational characteristics

Characteristic	Mean ranks	Z	Df	P value
Education level				
• No formal education	200.50			
• Adult education	190.95			
• Standard I-IV	202.96	4.269 ns	4	0.371
• Standard V-VIII	197.72			
• Post primary education	264.38			
Age categories (years)				
• 18-34	191.95			
• 35-64	204.06	0.693 ns	2	0.707
• 65-90	199.08			
Household size				
• 1-4	210.25			
• 5-9	194.08	2.106 ns	2	0.349
• 10-22	183.95			
Marital Status				
• Single	205.47			
• Married	198.66	-0.524 ns	1	0.600
Sex				
• Male	200.22			
• Female	201.43	-0.088 ns	1	0.093
Village				
• Haneti	254.54			
• Bereko	253.44	134.737***	3	0.001
• Membe	220.45			
• Kingale	95.36			
District				
• Kondoa	168.32			
• Chamwino	235.36	-5.803***	1	0.001

Key: ns = non-significant; * = significant at P≤ 0.001**

(a) Difference in respondents' mean ranks on drilled wells initiative process by their education level

With respect to education, the highest mean ranks were those of post primary education level (264.38). However, Kruskal-Walis H test did not show any significant difference in CMHHs respondents' opinions on sustainability of drilled wells projects initiative process by their education levels. This does not refute the importance of education level for community members, especially those who are directly responsible for sustainability assessment, planning and champions of the drilled wells projects.

(b) Difference in respondents' mean rank on drilled wells initiative process by their age categories

Table 7 shows differences in CMHHs' overall opinions with regard to sustainability of drilled wells projects by their age groups. The Kruskal Wallis-H Test did not reveal any significant difference on CMHHs' opinions pertaining to sustainability of drilled wells projects initiative process by their age categories ($p \leq 0.05$).

Nonetheless, respondents from active work age group (35-64 years) had more optimistic scores (204.06) followed by elderly respondents. Implication of these optimistic scores is that the two groups are most affected (moving from the village to neighbouring villages in search for water) when their own drilled wells projects are not functional to provide urgently need water on continuous basis.

(c) Difference in respondents' mean ranks on sustainability of drilled wells projects initiative process by their household size

With respect to household size, results in Table 7 shows that the highest mean ranks were those of medium household size of 5 to 9 persons, (194.08). However, Kruskal-Walis H test did not show any significant difference in CMHHs respondents' opinions on sustainability of drilled wells projects initiative process by their household size. Implication for these results is that, whether the household is small or large the need to a functional drilled well is always there, in order to supply the urgently needed water. What matters in household size is the amount of water that will be demanded. Keeping other factors constant, the larger the household the higher the demand for water service in this case the difference will be reflected in water tariffs.

(d) Difference in respondents' mean ranks on sustainability of drilled wells projects initiative process by their marital status

As indicated in Table 7, Mann-Whitney U Test did not reveal any significant difference in CMHHs respondents' opinions on sustainability of drilled wells projects by their marital

status. The single house head respondents had higher mean ranks (204.63) compared to married respondents (198.66). The optimistic mean ranks on single headed household imply their desire to have sustainable water services through sustainable initiative process since they are more vulnerable in case the projects do not materialise and continue to provide water services.

(e) Difference in respondents' mean ranks on sustainability of drilled wells projects initiative process by their sex category

As indicated in Table 7, Mann-Whitney U Test did not reveal any significant difference in CMHHs respondents' opinions on sustainability of drilled wells projects initiative process by their sex category. Females had higher mean ranks (201.43) compared to males (200.22). The higher optimistic scores imply the stronger desire of women to see their community-based projects are initiated on sustainable manner. Women are key stakeholders for ensured sustainability since they suffer more than men when the initiated drilled wells are not functional. Moreover, water projects such as drilled wells projects touch the interest of women than men. That is why women are eager once a communal project is initiated then it should come to completion and provide intended service. They are interested to see one water project operated at village level reproducing other small projects at operated at hamlet level, one water point reproducing several new water points in the hamlet to enhance accessibility of water services within 400 meters from the house hold as indicated in National Water Policy (URT, 2002).

(f) Difference in respondents' mean ranks on sustainability of drilled wells projects initiative process by their villages of residence

As show in Table 7, the results from Kruskal Wallis-H Test U Test revealed that there was statistically significant difference between CMHHs respondents' opinions on sustainability for those living in different villages of study ($p \leq 0.001$). The CMHHs

respondents from Haneti village had highest mean rank (254.54) implying higher optimism for sustainability of their drilled well-project initiative process compared to other villages; Kingale had the least mean rank (95.36) implying drilled wells initiative process is location specific. Due to intrinsic features, existing in different villages, projects initiative process tends to differ accordingly. The higher optimism for Haneti drilled well project was confirmed by one female key informant who said:

> "*Water is a sensitive service and Haneti community people know how to demand for downward accountability from their leaders. If we go without water from our drilled wells projects for say three days, then the village government is likely to be taken to task for being irresponsible. Our previous underperforming village government was uprooted and replaced with a more responsive one. We contributed funds and bought a new Chinese-make engine for TZS 12 000 000 using our own resources and our bank account is still active in case of emergency*". **Source:** KII Haneti village (2013). The text was translated from Kiswahili to English by the author.

(g) Difference in respondents' mean ranks on sustainability of drilled wells projects initiative process by district of domicile

Table 7 shows association between district of the study and CMHHs' opinions with regard to factors affecting sustainability of community-based drilled wells project initiative process. Mann-Whitney U test revealed that there was statistically significant difference between the two districts on CMHHs' opinions with regard to factors affecting sustainability of community-based drilled wells project initiative process ($p \leq 0.05$). Chamwino had the highest mean rank (235.36) implying higher optimism than Kondoa district with regard to community-based drilled wells project initiative process. Just like the case of village, the results on district suggest that drilled wells project initiative process was location specific. Some districts were better placed and endowed in terms of local leadership, experience, commitment and positive attitude towards communal projects compared to others.

In general, the findings on objective one of the study have shown that the initiation process is location specific depending on existing local context. The drilled wells projects in the study villages were initiated and implemented by central government in a traditional top-down approach, and that most important steps in community-based project planning were overlooked in NFDWs as compared to FDWs. This type of initiative process was basically resource-oriented, focusing mainly on supplying "the hardware" i.e. physical infrastructure of drilled wells, water points and water tanks while overlooking "software part" (the social background). Similar observation was made by Suzuki (2014) that many of people organisations in Paraguay formed by conventional external projects interventions, eventually end to unstable status since they lack necessary social background. Mlage (2014) focusing on sustainability of farmer groups in Tanzania reported similar observation highlighted on the need for commitment of all stakeholders, to facilitate local communities towards empowerment so that they can plan and take action for their own development agenda.

Implication of this is that it is necessary to get project initiation process right by ensuring a spiral process instead of one shot event. An appropriate project initiation process establishes a strong base for the community-based development project, and can make the difference between a sustainable and non-sustainable project.

From theoretical point of view, the results support the endogenous development theory which advocate in ward looking, self-reliance to effectively utilising local capabilities for initiating sustainable development projects. Project initiation process should include inputs from all relevant stakeholders, for that matter sufficient social preparation to create awareness, local sustainability assessment and incorporation of local policy in the local project management structure. Extent of stakeholder participation is another important ingredient for

sustainability of community-based development projects. In the next section, stakeholders' participation in different stages of drilled wells projects is discussed.

4.3 Extent of Stakeholders' Participation in Various Stages of Selected Community-based Drilled Wells Projects

Objective two of the study was to assess respondents' opinions on the extent of stakeholders' participation in various stages of community-based drilled wells projects. The key stakeholders in drilled wells projects were community members, Ministry of Water and Irrigation, Water quality laboratory, borehole drilling agency, donors, LGAs, the private sector, the Energy and Water Utilities Regulatory Authority (EWURA)and Water Basin Boards (Appendix 6). The purpose was to how implementation of projects was carried because proper initiative process leads to effective implementation and finally to sustainable projects.

The main indicators for this objective were: whether national agency actions manifested a long-term commitment to project goals; presence of a national policy statement that clearly defines the respective responsibilities of the government, the community, and the private sector arrangement for providing supplies; whether the community project committees or key individuals were confident of managing the project facilities and related activities. Others were: whether more women were serving in the project committee and participating in activities than before the project began; committees were given a voice and vote in all aspects of the project cycle (social preparation, sustainability assessment; project planning, implementation, monitoring and evaluation); project committees participated in project management and financial decisions; and whether the projects were managed within the existing institutional structure to facilitate continuation

of activities after it ended as opposed to creating a special project organisation (Appendix 1, question 3).

The overall results presented in Table 8 show that, on average, FDWs (Haneti, 78.57% and Bereko, 48.82%) scored relatively higher on all indicators compared to NFDWs (Membe, 47.60% and Kingale, 19.65%). Haneti drilled well project sounds the best in terms of stakeholders' participation.

Table 8: Percent distribution of CMHHs respondents' (n=400) opinions on extent of participation of stakeholders in different stages of drilled well projects by status of drilled wells

Opinion statement	Status of drilled wells			
	FDWs		NFDWs	
	Haneti (n=84) Agree %	Bereko (n=96) Agree %	Membe (n=108) Agree %	Kingale (n=112) Agree %
• National agency actions manifested a long-term commitment to project goals	78.6	69.8	53.7	26.8
• There is a national policy statement that clearly defines the respective responsibilities of the government, the community, and the private sector arrangement for providing supplies	75.0	38.5	35.2	12.5
• The community project committees or key individuals are confident of managing the project facilities and related activities	77.4	50.0	39.8	17.0
• More women are serving on the project committee and participating in activities than before the project began	95.2	66.8	72.2	42.9
• Committee were given a voice and vote in all aspects of the project cycle	75.0	44.8	48.1	9.8
• Project committees participated in project management and financial decisions	66.7	36.5	36.1	16.1
• The project was managed within the existing institutional structure to facilitate continuation of activities after it ended as opposed to creating a special project organisation	82.1	35.4	48.1	12.5
Average	**78.57**	**48.82**	**47.60**	**19.65**

Key: FDWs = Functional drilled wells, NFDWs = Non-functional drilled wells

But, since participation opinions were high in one out of the four villages, the results did not provide sufficient evidence that stakeholders actively participated in drilled wells projects, as presented hereunder.

4.3.1 National agency actions manifest a long-term commitment to project goals

The study sought to find out whether national agency actions manifest a long-term commitment to project goals (Table 8). CMHHs respondents from FDWs (Haneti, 78.6% and Bereko, 69.8%) and NFDWs (Membe, 53.7% and Kingale, 26.8%) had positive opinions. The results suggest that, with exception of Kingale drilled well project, CMHHs agreed that national agency (Ministry of Water and Irrigation and Agencies) actions manifest a long-term commitment to project goals. Kingale community members were exceptionally vulnerable because they felt neglected by national agencies because the best option for them would have been to drill a new project downstream to get water that is safe for human consumption. This means that the majority of the CMHHs were aware of the commitment of national agency with regard to drilled wells projects. Explanations from FGDs and KIIs show that national agency's commitments were expressed through awareness creation on water policy of 2002 which spells out that the communities have responsibility to manage their water facilities. Community members were aware that Ministry of Water and Irrigation is also implementing Water Sector Development Programme (WSDP, 2006-2025).

4.3.2 National policy statements that clearly define the respective responsibilities of government, the community and the private sector arrangement for providing spare parts supplies

The study also sought to establish whether there were national policy statements that clearly define the respective responsibilities of government, the community and the private

sector arrangement for providing supplies. The results presented in Table 8 show that CMHHs respondents from FDWs (Haneti, 75.0% and Bereko, 38.5%) and NFDWs (Membe, 35.2% and Kingale, 12.5%) had positive opinions. With exception of Haneti drilled well project, scores from the rest were too low, implying that community members were not fully aware of division of roles and responsibilities between public and private sector including community itself.

Drilled wells projects are guided by the National Water Policy of 2002, Public-Private Partnerships (PPP) policy of 2009,National Water Sector Development Strategy – 2006 to 2015 and the Second Five-Year Development Plan (FYDP – II) 2016/17 -2020/21 (Appendix 7). The National Water Policy of 2002 defines the division of roles and functions; however, the main concerns are awareness and compliance. According to KIIs, Water Act and its regulations were not well known to many of community members. This was confirmed in FGDs that only few members had seen a copy of the water policy of 2002. Awareness on national policy statements which defines the responsibilities of the government, community, and private sector in providing supplies is an essential element for participation. It is only when the community members are aware of prevailing policy statements and amendments that they can comply with them. In order to overcome this discrepancy, VEOs and VWCs need to display copies of relevant water policies, regulations and guidelines at village office. These documents should be elaborated during village meetings.

Substantiating the awareness issue, explanations from FGDs revealed that sometimes there was confusion among members of community when private operators were commissioned to operate the drilled wells projects in line with public-private partnerships (PPP) policy of 2009. Some members tend to think that the community projects were being sold out to

individuals. Likewise, the definition of private sector among the community members was narrow, focussing on rich individuals from outside the community while in reality even one of their fellow members who met the laid down criteria could become a private operator of the drilled wells project through a legal contract.

Another concern with regard to policy statement on responsibilities of stakeholders is that when water technicians from department were called in for repairs of pumps and engines, they were paid subsistence allowances by the community through water funds. Community members thought that it was unfair for district officials to receive allowances from the community. On the contrary, the community members thought that their employer, the district council, should pay their allowances for them to execute their duties of maintaining the community projects. The water fund should be used for spare parts and expansion or improvement of facilities. Explanations from KIIs indicate that allowance for technicians erodes the water funds whenever there is a breakdown. With respect to sustainability, allowances tend to detract technicians' responsiveness from projects with unstable water funds.

The implication of this is that, as part of supportiveness from LGA to community projects, water policies and regulations should bind LGAs to pay for district officials and water technicians when they are visiting the drilled wells projects instead of depending on community water funds. Allowances are suppressing the growth of local artisans. In order to enhance projects sustainability, teams of local artisans based at the grass root level should be formed and capacitated to take care of the drilled wells projects.

According to the National Water Policy formulated by URT (2002), the role of the Central Government is to issue policies and regulations; District Councils are supposed to oversee

project implementation, provide extension services and technical assistance. The role of community is to implement; VWC is responsible for day-to-day management, monitoring and evaluation of the project while the private sector provides services needed by the project such as repairs and spare parts (URT, 2002). Realities on the ground show that compliance to these regulations on division of roles and functions is a critical issue. Policy makers and practitioners should come up with collaborative and cooperation relationships that will ensure every stakeholder; including LGAs, community members and private sector are complying with their roles and functions.

4.3.3 Community project committees or key individuals confident of managing the project facilities and related activities

The study sought opinions if community project committees or key individuals had confidence of managing the project facilities and related activities or not. The results presented in Table 8 show that CMHHs respondents from FDWs (Haneti, 77.4% and Bereko, 50.0%) and NFDWs (Membe, 39.8% and Kingale, 17.0%) indicate that committees or key individuals (private operators) were confident of managing the project facilities and related activities. The relatively high scores for FDWs suggest that their community project committees or key individuals were confident of managing the project facilities and related activities. This is a result of established level of trust since the community members from the *hamlet* level know each another better and they should play the central role for their development (Chambers, 2007). On the contrary, the results indicate low scores for NFDWs, implying low capability and confidence of managing the project facilities.

The results suggest that potential for sustainability increases if the projects are implemented in cohesive communities which are well organised and well prepared. It

becomes easy to introduce new ideas due to already established capabilities and cohesiveness of the people at that level. Those potentials exist at *hamlet* level or at small villages which started spontaneously as *hamlet,* but when such villages expand into bigger size become unmanageable for collective actions hence interveners need *hamlet* as a right place for collective actions.

Further, through probing during FGDs in NFDWs, it was revealed that the committee members were democratically elected, but elections did not consider important criteria such as voluntarism, capability, attitude, integrity, honesty, self-control, discipline and experience of individuals. Rather, it was based on gender and representation from each hamlet. Most of the community members made blind voting since there were no defined criteria. To make the matter worse, in all the study villages, VWC members were paid daily allowance; hence some of them considered this chance as a source of income. In this kind of arrangement, it is not easy to have members of VWC with the right attitude as they are attracted by allowances. Moreover, these allowances attracted political interference and frequent reshuffles of VWC members. The implication of this is that water regulations should ensure that membership to VWCs is voluntary and rotational.

Moreover, according to explanation by KIIs, there were no induction training courses for newly elected VWC members to orient them; as a result, their performance was low. This situation can also be explained by the low levels of education among CMHHs. The majority had attained primary education level. Lack of orientation was attributed to weakness among the community facilitators. In addressing facilitation problems, Dodoma region created multidisciplinary teams of facilitators for water and sanitation in all districts. These teams were formed under water and sanitation programme (WAMMA) with support from Water Aid. After the programme, these teams were mainstreamed in the

local government structure. The teams are responsible for facilitation and orientation of VWC, but they lack funds hence they do not engage with community unless there is an emergency. In addition, members of VWCs in the study area expressed their dissatisfaction with dominance of local authorities (village governments) in VWCs activities. This is because of organisational set-up which does not give sufficient autonomy to VWCs.

The implication of this is that there is a need for defining criteria during selection of VWC members. Similarly, there is a need for training sessions, particularly orientation and on-the-job training (OJT) in order to improve performance of VWC members. The VWC members should possess certain favourable attributes, e.g. voluntarism, high literacy level, elements of trust, positive attitude, commitments; skills, and experience gained through networking and exchange visits to successful projects to enhance their confidence of managing the project facilities and related activities more efficiently. Communal asset management should contribute to people's capacity building through experience-based learning.

Another area of concern was insufficient legal counselling from the LGAs. This problem was reported during KIIs at Kingale and Haneti. Legal counselling is the process of helping a client (village government) to make an informed decision within the legal framework. According to KIIs, most of village governments had been in legal contracts with private operators without prior seeking legal advice from State Attorney. Sometimes, there were no written documents; instead there were verbal "gentlemen agreements" as it was the case for Kingale project. Although the village government members knew the importance of legal counselling, they tended to violate it to conceal personal interests in

the deals. This situation had repercussion on financial, service loss and legal crisis in case one party default the contract.

During data collection, Kingale village had a legal dispute between village government and a private operator with regard to previous contract on the drilled wells project. The situation was made worse due to limited number of legal experts, who are found only at LGA level. Likewise, there was a misconception of village autonomy on legal matters leading to ineffective management of the projects rendering them non-sustainable. These results imply the need for basic legal training to all stakeholders in order to enhance legal sustainability of drilled wells projects.

Through further probing from KIIs in all the four projects, it was revealed that experienced villages such as Haneti and Bereko had accumulated diverse types of experience through experienced-based learning in communal projects as compared to new villages emanating from operation villagisation of 1973. For instance, community members based at Haneti and Bereko villages, had experience in *hamlet* road construction, constructing primary school classrooms, dormitories in their boarding secondary school, dispensary, warehouse, and police post which were located at the village with village leaders taking the lead.

One follow-up question to KIs was whether the communities in the study area had experience of managing communal assets especially those generating revenue. Explanations from KIs showed variations in peoples' level of experience on management of communal projects. Most of communities have experience of mutual supporting each other on reciprocity principle. Besides, in all the four study villages, community members had reached experience of resource pooling such as saving and credit schemes (SACCOs) and merry-go-round. Correspondingly, all the communities had experience on communal

asset management such as public-school management. But, it was only in Haneti village where community members had sufficient experience of managing surplus-generating communal assets such as drilled wells projects. The KIs admitted that drilled wells projects are slightly complex projects which need high degree of trust, honest and voluntarism.

These results imply that organisations for managing drilled wells projects (VWCs) in the three villages of study area were not strong enough to manage surplus revenue generated from communal projects. That is why sometimes village governments for example, Bereko village government, took over the roles of VWCs. Instead of addressing the problem of experience, communities were trying to hide this weakness by contracting the projects to private operators to operate facilities instead of peoples' organisations. The role of private operators should be limited to repairs, maintenance, supply of spare parts, but not daily operation. This arrangement suppresses experience-based learning of community to operate communal surplus generating enterprises. Hence a more effective project management organisations model is needed that will ensure sustainable community-based management of drilled wells, as wells, as other community-based projects.

4.3.4 Women serving on the project committee and participation in communal activities

The study also sought to determine whether more women were serving on the project committee and participating in communal activities than before the project began. The results in Table 8 show that CMHHs respondents from FDWs (Haneti, 95.2% and Bereko, 66.8%) and NFDWs (Membe, 72.2% and Kingale, 42.9%) had positive opinions that more women were serving on the project committee and participating in communal activities than before the project began. In Tanzania and other developing nations, it is assumed that

women participation is indispensable for successful community development projects (Haataja *et al.*, 2011; Narayan *et al*., 2000; María *et al*., 2007; Chambers, 1995).

Appointment of women in decision making is important not only to ensure sustainability of target projects, but also in the community development process (Haram, 1999). There is an accumulation of evidence to show that if more women are appointed as the decision makers for a project on the ground, the success rate goes up almost instantly (Ishii, 2014). That is why the results in this study imply that in three out of four projects, women inclusion was taken seriously according to water regulations and Women and Gender Development Policy (URT, 2000a). Kingale being predominantly Muslim community, religious and cultural barriers were hindrance to women participation. However, KIIs from Kingale village confirmed that situation is improving and more women had been coming forward to take up their communal role.

4.3.5 Committees' voices and votes in all aspects of the project cycle

The study sought to determine whether committees were given a voice and vote in all aspects of the project cycle in pursue of genuine participation of stakeholders as proposed by Narayan *et al*. (2000) in their book titled "Voices of the poor: crying out for change". The results presented in Table 8 show that CMHHs respondents from FDWs (Haneti, 75.0% and Bereko, 44.8%) and NFDWs (Membe, 48.1% and Kingale, 9.8%) had positive opinions that project committees were given a voice and vote in all aspects of the project cycle. According to KIIs, the results reflect the fact that most decisions were made by central government until 1995 when decentralisation of drilled wells projects was affected. Results from FGDs in Kingale village show that failure of project implementers to listen to beneficiaries' voices led to inappropriate site selection for drilling a well; while in Haneti keen attention to peoples' voice led to appropriate site selection that is reflected on quality of water. This is what was meant by Chambers (1993) *"*putting the last first".

The results suggest that voice and vote of people in drilled wells projects were underrated, contrary to “genuine participation” put forward by Sharma and Ohama (2207). It is also against the recommendations put forward by Adams (2008) and Wambura (2010) on empowering the local peoples’ organisations to take control of their own affairs. It is insisted that grassroots participation in decision-making process and development programmes correlate to sustainability of community development programmes (Abiola and Bello, 2013).This implies that there is a need to empower local committees to make decisions throughout project cycle, especially during implementation and post-project phases. This is how community members will acquire experience-based learning, an important aspect to sustain drilled wells projects. During FGDs and KIIs, political interference was reported in all the four projects. CMHHs respondents were not satisfied with political interference in enhancement of drilled well projects. According to FGDs and KIIs in all the four study villages, there had been cases of political interference in management of drilled wells funds, contract awards to POs and free access to water services. That is why a recent study by Akhmouch and Clavreul (2016) calls for administrators in water sector to practice what they preach by giving voice to people

Harmonious interaction between politicians and technocrats is important for development and sustainability of CBDPs. According to Rogger (2014), there are many reasons for political interference in development projects. Foremost, politicians would like technocrats to facilitate CBDPs that might win them more votes and popularity among voters. Second, politicians and or their relatives would like to use their political influence to siphon benefits from development projects that are being implemented in their constituencies. The third reason for political interference is to use the projects as stepping stones, hence emerge the winner in competition against their political rivals.

4.3.6 Project committees' participation in project management and financial decisions

The study also sought to establish if project committees participate in project management and financial decisions**.** Table 8 indicates that CMHHs respondents from FDWs (Haneti, 66.7% and Bereko, 36.5%) positive opinions that project management and financial decisions were made by committees. In case of NFDWs (Membe, 36.1% and Kingale, 16.1%) had low opinion indicating even when the drilled wells were in operation financial management was not good and it may be one of the reasons for non-functionality status. Furthermore, low scores in three out of the four projects imply a critical financial management problem in both FDWs and NFDWs projects. This is contrary to "genuine participation" of stakeholders at all levels and at every stage of the project as prescribed by Sharma and Ohama (2007). The explanations from FGDs and KIIs revealed that the village financial management process was suffering from lack of basic accounting skills, weak record keeping, lack of faithfulness and transparency, misappropriation and interference with water funds by village leaders.

This implies that participation of project committees in management and decision-makingprocess in all the four drilled wells projects was not effective. The reasons include weakness of the committee members, but also it was observed that village government kept a strong handling on financial management on pretence of necessary financial control. Yet, KIIs across the study area complained of lack of transparency on actual water revenue and expenditures. This was due to lack of proper record keeping of income and expenditure on their projects. This will eventually affect sustainability of drilled well projects. Kandie (2001) confirmed that strong user committees a key factor for sustainable development of drinking water facilities. For that sake, Darma (2011) calls for the need of

local communities to establish strong organisations or committees that make sound decisions pertaining to their development projects.

In summary, responses from KIIs revealed that LGAs were not supportive enough to project especially at post-implementation stage as they lacked an unconditional budget. All maintenance costs including payment of allowances to technicians from district water department was met by water fund. The EWURA's role of regulating water tariffs was not realised in all the study villages. The role of Water Quality Laboratory was not observed as there was no evidence of laboratory technicians visiting the drilled wells for sampling twice a year as stipulated in water regulations. WAMMA teams were not regularly accompanying the projects' committees. All the above have negative implication for sustainability of drilled wells projects. Nevertheless, the lessons drawn from the results is that when there is genuine, active participation in drilled wells projects, there is high likelihoods of sustainability. People are the main actors and the government is the supporter. The essence is nothing else but the spirit of Mwalimu Julius Kambarage Nyerere who said "People cannot be developed but they can develop by themselves". From this essence, the collaboration between the government and people will be developed and people will make self-help efforts more and more to overcome challenges identified by themselves.

This essence is benefitting not only for the people but also for the Government itself. The merits for the Government are so many. First of all, sustainability of the results of the projects can be ensured based on ownership from the people. People's experience and confidence can be accumulated through implementation of their own projects so that they can continue activities and improve themselves to solve more problems. Cost reduction can also be realised leading to increased number and diversity of projects. Trusty relationship between LGAs and people can be also promoted because people will

appreciate the Government more if the Government supports what people started by themselves.

4.3.7 Projects' management within existing institutional structure

The study inquired whether the drilled wells projects were managed within the existing institutional structure. Table 8 shows CMHHs respondents from FDWs (Haneti, 82.1% and Bereko, 35.4%) and NFDWs (Membe, 48.1% and Kingale, 12.5%) had positive opinions that drilled wells projects were largely merged into local government institutional structure. Tanzania has a well-established administrative village structure as part of local government organisation; hence all the four projects were managed within this structure. This local setting down to grass root level answers the question by Chambers (1997) that whose reality counts in sustainable development. The results revealed that, with exception of Haneti drilled well project, the scores were too low, suggesting that probably these projects were not managed within the existing institutional structure to facilitate continuation of activities. Further probing revealed that, before 1995, all projects were managed and operated by the government through district water departments. After 1995, all the drilled wells projects were operated by VWCs under oversight of village governments, but this local institutional arrangement was not functioning adequately to expectations of beneficiaries. The main weakness is capability of those existing structures to manage revenue generating projects.

Since drilled wells projects were the only regular income generating projects in the study villages, the revenue generated attracted interest of village governments' members and politicians, leading to misuse and poor financial management. Explanations from FGDs and KIIs confirmed existence of conflicts of interests between VWCs and village governments emanating from revenue generation by drilled wells projects. Village

governments have often taken over management function from VWCs for various reasons including misuse of water funds, drop-out and also to increase the power of village governments themselves. This situation necessitated contracting of projects to private operators. This option was thought to be easy and cheap operational structure.

The private operators in the FDWs have proved to be efficient but just in the short run. Some of the critiques levelled against private operators are that they are excessive profit oriented individuals; one of the contracting parties might exploit missing conditions of the contract e.g. not being interested in operating water points which have few clients or during low water demand (Water Aid, 2009). Unlike VWCs, POs are not interested in expansion of water points to newly established hamlets. Under the POs management set-up; community members, VWCs and even village governments have very little to do in the drilled wells projects.

This tendency undermines experience-based learning process gained through continuous operation of the communal projects by the people themselves. It is also against the Endogenous Development Theory as it puts more emphasis on individual private sector to operate the facility instead of community through their representatives. When an individual operates the facility, VWC, village government and community members have little to do and hence do not build capabilities for solving emerging problems. In the long run this arrangement tends to jeopardise sustainability of the projects. The long-term implication is that a more feasible alternative mechanism to manage the drilled wells projects sustainably should be sought. A mechanism is also needed that will put the community members at the centre of the project management process instead of excluding them from the process. A mechanism is needed that will minimise instead of propagating corruption, mismanagement and irresponsibility in drilled wells projects.

Generally, the results in this section pertaining to objective two of the study have shown the extent of stakeholders' participation in different stages of drilled well project. Empirical evidence shows that there was no genuine participation of the communities in different stages of drilled wells projects. At the initial planning and implementation stages the type of participation was "tokenism" type, in which beneficiaries were only informed that a project was going to be implemented to address their water needs. The results are supported by Mutimba (2013) that community's extent of participation has direct influence on sustainability of donor funded projects.

In post implementation stage, the drilled wells projects were decentralised to local community in a rushed manner, without prior social preparations that are necessary for sustainable operation of drilled wells projects, i.e. deployment of technical water personnel, orientation courses; organisation building and strengthening, norms formation and financial management regulation. It is implied that, in order to ensure sustainability of future interventions, mechanisms could be instituted that are inclusive, engaging all key stakeholders in all stages of project identification, design, implementation and post implementation. Implication is that without genuine participation of stakeholders including the local communities in project design, implementation, monitoring and evaluation, the communities cannot develop the ownership attitude that those drilled wells a project belongs to them. Moreover, stakeholders' participation in various stages of community-based drilled wells projects was one single and important dimension that determines whether projects become sustainable or not.

From theoretical point of view, Endogenous Development Theory insists on self-reliance, implying that each community relies primarily on its own strengths and resources in terms of its members' energies and its natural and cultural environment. The findings show that this condition was partially met. During implementation stage, community members

offered labour in making trenches, however to great extent there was a tokenism type of stakeholder participation which does not empower beneficiaries to manage their projects on sustainable manner. Other key dimensions of sustainability are social, economic and environmental aspects. These aspects are thoroughly discussed in the following section.

4.4 Social, Economic and Environmental Factors Influencing Sustainability of Community-based Drilled Wells Projects

Objective three of the study was to determine social, economic and environmental factors associated with sustainability of community-based drilled wells projects. In-depth understanding of these factors could provide insight as to why sustainability of drilled wells and other community projects remains a major challenge in Tanzania. The purpose was to assess overall factors influencing overall initiation process, implementation process and sustainability phase because proper initiative process leads to effective implementation and finally to sustainable projects. The list of indicators for this objective is found in Appendix 1, Question 4 and presented in Table 9.

4.4.1 Respondents' satisfaction with service provided

The study sought to establish if the CMHHs were satisfied with service provided and contented to see the changes with respect to drilled well water services. The results presented in Table 9 indicate that CMHHs respondents under FDWS (Haneti, 47.4% and Bereko, 17.7%) were satisfied with services provided with respect to drilled wells projects while NFDWs (Membe, and Kingale) had zero response respectively indicating that their community members were not satisfied with services provided. Explanations from KIIs in NFDWs revealed two critical issues. One was how projects had been implemented and the second was scope of the projects coverage and location of water points.

With respect to how the drilled wells projects were implemented, the KIIs had opinions that it was a macroscopic, top-down approach covering the entire country to achieve free water for all. Despite good intention of the government and donors, beneficiaries from the grass root level were not fully engaged in the decision-making process as recommended by Abiona and Bello (2013) that community engagement yields greater interest, satisfaction and sustainability of their CBDPs. The argument is that actual engagement of beneficiaries in implementation of the projects leads to experience-based learning and ultimately empowerment and transformation of local autonomy into reality (Chambers and Conway, 1992). This is the most important step to ensure sustainable participatory process. Nevertheless, implementation of planned projects by stakeholders requires self-organising, coordinated efforts, confidence and commitment of all parties involved. In this line of reasoning, Africa Progress Panel (2010) strongly suggests that communities should put their agenda into action in order to turn resources into results. In all the four drilled wells projects, there is no evidence of community initiatives (CIs), rather it sounds as if the government was responding to one of priorities of people (wish-list). This was not appropriate, because in order to sustain our community-based development projects efforts should have been made to ensure that communities had taken initiative or action before external supports comes in.

The second issue was coverage and location of water points and water tanks. According to explanations from KIIs, the projects were implemented at village level; hence the social location aspect was considered. Nevertheless, the limitation of administrative village level is that collective efforts for communal projects are less developed as compared to those at hamlet level. This discrepancy is due to fact that at the hamlet level, members in the neighbourhood are more cohesive, know one another and have developed trust than at village level. Another concern is that the project implementers established few water

points compared to the number of hamlets existing in the village. In the case of Membe village drilled well project, there was still a single water point since 1976 serving more than five hamlets during the time of visit. Hence, the community members consider the project to be incomplete. The drilled well and the reservoir are located in one corner of the village, inaccessible by households in hamlets located at the extreme peripheries and those at higher elevation. In Kingale village, water from drilled well is too salty and is unfit for most of domestic uses.

The implication for this discrepancy is that the main actor for community-based development projects is not only the government; people should be the main actors in implementation because they know better what they want and where facilities should be located. Hence, when the government and other stakeholders are making interventions in the community, both social (committee or village government) and geographical (village or hamlet level), locations of projects should be considered. Sufficient numbers of water points should be established to enhance accessibility of service at every hamlet. It is only when the beneficiaries enjoy the benefits of a given project that they will consider its sustainability. Following the above results, it is imperative that mind-set change is necessary for both government and community members in order to create a collaborative relationship required for effective, relevant and sustainable community projects. In case of breakdowns, village pump attendant would call in technicians from water department at the district level; hence there was no formal monitoring and evaluation (M&E) system.

The results conform to Segerstrom (2006) that optimists get what they want from life as compares to pessimists. No single CMHH respondent was satisfied with non-functional status in Membe and Kingale. Although Haneti sounds better compared to Bereko, the scores for both projects were generally low, implying that community members were also

not satisfied with services provided from their drilled wells projects. Users' dissatisfaction was due to lack of better quality and lack of water service year-round because of frequent breakdown of water-lifting devices.

Table 9: Percent distribution of CMHHs respondents (n=400) opinions on social, economic and environmental factors influencing the sustainability of community-based drilled wells projects

Opinion statement	Status of drilled wells			
	FDWs		NFDWs	
	Haneti (n=84) Satisfied %	Bereko (n=96) Satisfied %	Membe (n=108) Satisfied %	Kingale (n=112) Satisfied %
• Users are satisfied with service provided and content to see no changes	47.4	17.7	0	0
• Trained professionals are available to maintain and repair the facilities	39.2	19.8	17.2	0
• Spare parts supplies for drilled well and system of their distribution are available	25.0	15.6	13.9	0
• There is evidence of positive behaviours related to hygiene	56.2	8.4	7.4	4.5
• The communities do receive information about the project through the media or extension agents	10.7	8.3	7.4	9.8
• Communities do have adequate communication channels with government agencies and private sector to express community needs	4.8	4.2	2.8	2.7
• Project rules are clearly defined and understood by all responsible parties	13.1	2.0	0.9	1.8
• The responsible parties especially community have resources to cover the project costs	13.1	4.2	13.0	8.9
• The ownership of the project is clearly defined	33.3	17.7	13.0	11.6
• There was evidence of flexibility in adapting to problems related to sustainability during the course of implementation	40.5	5.2	9.3	8.0
Average	**29.09**	**6.26**	**12.19**	**5.1**

Key: FDWs = Functional drilled wells, NFDWs = Non-functional drilled wells

probing during FGDs revealed that community members were not satisfied with the aging, non-functional drilled wells i.e. Kingale was idle for the previous one year; Membe was idle for the previous three months during the visit time. Other areas of dissatisfaction were lack of replacement funds to address depreciating infrastructure, poor record keeping, lack of water metering system in all the four projects, poor financial management, lack of transparency, poor capacity of VWC members and village leaders, weak mechanism for engaging private operators in FDWs and political interferences.

Moreover, explanations from KIs revealed that not all hamlets were connected to water points. It should be recalled that all four drilled wells were established at village level and some villages are too big (more than seven hamlets) to be served by a single drilled well. Hence, it was not possible to reach everybody in the village with water service to the extent of satisfaction because the service source was very far from the people. All of these circumstances hamper water revenue mobilisation and subsequently delayed repairs of drilled wells in case of breakdown, which in-turn affected sustainability of projects.

With respect to water tariffs, explanation from FGDs in FDWs indicates that community members were satisfied that water tariffs were democratically set and hence affordable to the majority of local people. Affordability of water for sustainable development is an important cost factor, especially for livelihoods of poor households. During the visit, the water prices ranged from TZS 20 to 50 per bucket of 20 litres, TZS 30 per cow and TZS 20 per small ruminant. These prices have prevailed for more than a decade. Although, during FGDs, community members did not seem to be worried about low water prices, it was a concern of the KIs from outside the study area that these prices were low, and did not reflect the economic value of water resource. The low water prices undermine the

communities' ability to mobilise sufficient revenue for maintenance and repairs of their drilled wells.

In reality, water resource in the study villages was under-priced. Under-pricing of a resource has adverse consequences on sustainability of the drilled wells projects as they could not easily mobilize sufficient revenue urgently required for maintenance and repairs. The price communities charged for the service or product is one of the most important business decisions made. This has policy implication in the sense that there must be indicative prices to serve as a bench mark.

4.4.2 Availability of trained professional to maintain and repair the facilities

The study sought to find out if trained professionals were available to maintain and repair the facilities. Table 9 shows that CMHHs respondents from FDWs (Haneti, 39.2% and Bereko, 19.8%), NFDWs (Membe, 17.0%) had positive opinions those professionals were available to maintain and repair the facilities while Kingale, the response was zero The scores for this indicator were generally low across the four projects, implying that community members were not satisfied with the number of technicians. According to explanations from KIIs, all drilled wells are repaired by technicians from the District Water Departments. The main challenge is limited number of trained experts. Sufficient number of facilitators to facilitate the communities to have better understanding of reality of their surroundings and capabilities of communities including resources, knowledge, skills and experiences by sharing ideas and perspectives (Chambers, 2007; Chambers and Conway, 1992).

Table 10 shows the distribution of water experts in the study area. Kondoa district, with 97 villages, had only four technicians and one engineer. Likewise, Chamwino district with 77

villages had one engineer and four technicians. The reason for few water experts is that there is only one water institute (Water Development and Management Institute) in the country with limited annual output. Along with water technicians, community development officers were necessary to facilitate community in order to sustain the water projects. In the study villages, community development officers are found at ward levels and they are few in number to cover all villages. Thus, it is not possible to sustain the drilled wells projects with so limited number of community facilitators.

Table 10: Number of professional staff in water sector in the study area

Experts	RS-Dodoma	Kondoa DC	Chamwino DC	Total
Water Engineers	2	1	1	4
Civil Engineers	1	-	-	1
Hydrologists	1	-	-	1
Hydrology technician	-	-	1	1
Pump mechanics	-	1	2	3
Water Technicians	-	1	-	1
Civil Technicians		2	1	3
Subtotal	**4**	**5**	**5**	**14**

Source: Dodoma Regional Secretariat (2013)

Another concern is resistance by water department experts. Although the number of available technicians was low, local artisans were strictly prohibited from attending the project facilities, creating a monopoly by technicians from the water departments. One of the challenges observed in decentralised drilled wells projects is getting LGAs to loosen their grip on power and turn it over to localities. Although LGAs had no sufficient number of technicians yet they were reluctant to release maintenance role to local communities.

With regard to this aspect, explanation from one KI reveal that there was a kind of resistance from Ministries, Departments and Agencies (MDAs) related to water projects from devolving the functions of maintaining the drilled wells. This was reflected in lack of training to local people to manage their projects and retrogressing tendencies of MDAs by withholding community's freedom of executing certain functions such as repairs. Besides,

all water accounts for each village were controlled by district water department implying no village could utilise water revenue without prior authority of district council.

During FGDs, community members expressed their concern that there were no efforts to train local artisans to take over the function of maintenance and repairs of the drilled wells on sustainable basis. There was a tendency to neglect local experience which is very important for sustainability of community projects. Underutilisation of locally available human resource is undermining sustainability of drilled wells projects. It was argued by members of FGDs that the engines installed in the drilled wells were similar to engines of milling machines which are promptly repaired by local artisans at lower cost compared to technicians from district water departments. This situation implies that training of local artisans from among community members could be a key element to project management and sustainability of the community-based development projects. This would serve as pillars of long term sustainability of drilled wells projects.

4.4.3 Availability of spare parts for drilled wells and supply system

The study also sought to establish whether spare parts supplies for drilled wells and system of their distribution were available. The results presented in Table 9 indicate CMHHs indicate that respondents from FDWs (Haneti, 25.0% and Bereko, 15.6%) and NFDWs (Membe, 13.9%) had positive opinions that spare parts supplies for drilled wells and system of their distribution were available while for Kingale response was zero. Scores across the four drilled wells projects were generally low, implying community members were not satisfied with the spare parts supply system that existed. Community members in the study area did not know where to purchase spares; rather they considered it as a role of district water department. Explanations from KIIs revealed that all spare parts for the two study districts were procured from Dodoma Municipality. In Dodoma,

there were only two dealers of drilled wells spares, namely Hombolo Investments and Loshya Investments LTD. Local communities had no direct linkage to the dealers.

The number of dealers in Dodoma was limited to two because, according to water technicians, drilled wells' spare parts are not fast-moving goods as they depend on the frequency of breakdown. Moreover, technicians from the District Water Departments were the ones who dictated the supplier from whom to purchase spare parts. This situation created unnecessary monopoly and price exaggeration. Complicating the matter, the dealers were cash-on-delivery, rather than after-sale service, which could ensure timely access to spare parts and paying later to ensure continuity of water service. This situation suggests need to link the community with input markets, so that they can access the spare parts from the free market at market prices. Community members have little knowledge on procurement process; hence, there is a need to provide training on procurement skills to enable VWC members to procure cost-effective spare parts.

Further probing during FGDs revealed that all repairs were made by very few technicians from District headquarters. Although the projects had been decentralised for more than 15 years, there were no maintenance teams composed of local artisans at the grassroots level in line with endogenous development theory that emphasizes utilisation of local resources and local organisations.

4.4.4 Evidence of positive behaviours related to hygiene

The study also sought to establish the evidence of positive behaviours related to hygiene. The results presented in Table 9 show those CMHHs respondents from FDWs (Haneti, 56.0% and Bereko, 8.4%) and NFDWs (Membe, 7.4% and Kingale, 4.5%) had positive opinions that there was evidence of positive behaviours related to hygiene. With exception

of Haneti drilled well, the scores across the four projects were low, suggesting that community members in the study villages had not adopted hygienic habits and practices such as use of toilets, general cleaning, washing hands and the use of safe and clean water from water points. Some people were still resorting to draw free water from unprotected traditional ponds, roadside water harvest and hand dug boreholes instead of paying the agreed cost. Kusago (2008) using a popular case of Minamata cautioned that use of polluted water has serious consequences socially, as well as, economic that may influence sustainability of the CBDPs negatively. Many community members were not ready to contribute or buy water especially during rainy season when they have several alternatives to get water from ponds and seasonal streams. These improper alternatives of water source subsequently led to health burden in the communities due to poor sanitation and hygiene, the situation attributed by knowledge gap on sanitation and hygiene (Thomas *et al.,* 2013). The results in Table 9 imply that facilitators in the study villages had not carried out effective total hygiene and sanitation campaigns, which go hand-in-hand with water projects as suggested by Chavan *et al.* (2011). The aim of total hygiene and sanitation campaigns is to realise positive attitude change of people related to established water projects.

It was observed in FDWs, particularly at Haneti, that pupils in primary school and students in secondary school were regularly washing hands after attending wash rooms, implying behavioural change. Further explanations from FGDs and KIIs in NFDWs, particularly Membe village, revealed that a number of households had not constructed toilets; hence they were not using toilets, a habit which curtailed the ultimate goal of drilled wells projects of improving community livelihoods to achieve Sustainable Development Goal numbers one, three and six..

At Haneti village, KIs confirmed that, compared to the past, more households were encroaching the site of the drilled well, hence, some pit toilets were located within 30m, which is the minimum recommended distance. Moreover, there was a dip tank which had been in operation for over 40 years, and was located within 30m from the drilled well. Hence, there was a possibility that accumulated heavy metals residues from acaricides used in cattle dipping could have percolated deep into the aquifer, hence contaminating the water. Moreover, there was a flood water way just beside the drilled well which posed a danger of contaminating the water source in case of heavy floods.

As discussed in section 4.5.1, Kingale project had been non-functional for the previous one year to the time of visit. Even when the well was operational, the water quality was too saline for domestic use; hence the water was used mainly for livestock during dry seasons. Community members bought water from surrounding villages; and it was difficult to adequately adopt proper hygienic behaviour using expensive water from vendors. In wet seasons, community members used water from sandy-rivers and rain water harvest. The researcher observed the community members drinking water from sandy rivers directly without boiling.

The results also showed that there were no regular water tests across the four drilled wells projects due to high cost of water sample analysis. According to technicians at water laboratory in Dodoma, the cost per sample was TZS 250 000 and sampling was to be done twice a year, during wet and dry seasons. Two mandatory samples would be drawn, one for a biological test and the other one for a mineralogical test. In all the four drilled well study projects, there was no regular flushing and washing of water tanks. Moreover, according to KIIs, it was only in Haneti project where water treatment had ever taken place. This happened when the drilled well was contaminated with flood water, and there

were case of water related illnesses reported in the village dispensary. Failure to attain change of behaviour related to hygiene is likely to jeopardise the sustainability of drilled wells projects.

The amount of water usage in the project areas was below the national water use standard, which is 60 litres/person/day, and of WHO standard which is 25 litres per person per day in rural areas. The inadequacy was mainly contributed to long distance to water points from households, which estimated to range from 2 to 7km as compared to national minimum standard (NMS) of 0.4 km. More than 50% of the communities in NFDWs were getting water for their domestic use from unprotected sources especially during rainy season.

4.4.5 Information flow about the project through the media and extension agents

The study sought to find out whether communities received information about the project through the media or extension agents. The results presented in Table 9 show that CMHHs respondents from FDWs (Haneti, 10.7% and Bereko, 8.3%) and NFDWs (Membe, 7.4% and Kingale, 9.8%) had positive opinions that communities received information about the project through the media or extension agents. The scores across the four projects were low, implying community members were not readily accessing information about the projects to enhance their decision making. This situation undermines the scholarly suggestions that local people should be given priority in information sharing in participatory manner to enable them make appropriate decisions (Chambers, 1993; Sharma and Ohama, 2007; FAO, 2013).

Explanations from KIIs and FGDs showed that only few households had access to radio and television. Young community members were increasingly using their mobile phones

to access information. Just like in many parts of Tanzania, in the study area there were very few community development officers and agricultural extension workers, mostly located at ward office. There was no single water expert below the district level, hence limited information dissemination by extension agents on water projects. Exceptionally, Kondoa District Council, in response to limited number of extension agents, had in place a multi-sectoral community facilitation team (WAMMA), but due to financial constraints, it was active only during emergencies.

4.4.6 Communication channels with government agencies and private sector to express community needs

The study also sought to establish whether the communities had adequate communication channels with government agencies and private sector to express community needs. The results presented in Table 9 show that CMHHs respondents from FDWs (Haneti, 4.8% and Bereko, 4.2%) and NFDWs (Membe, 2.8% and Kingale, 2.7%) had positive opinions that communities had adequate communication channels with government agencies and private sector to express community needs. The results did not reveal much difference (as shown by the percentages of respondents from the four projects); implying community had limited communication channels with government agencies and private sector. Explanation from FGDs and KIIs pointed out unnecessary bureaucracy as an obstacle, especially when accessing government offices for information. Notice boards, mobile phones and general assembly were the main communication channels in the study villages. To effectively convey and receive information, communication channels are necessary. Effective communication plays an important role in service delivery; it informs and influences behavioural change among community members that is necessary to sustain the CBDPs.

4.4.7 Understanding project rules among responsible parties

The study sought to find out whether project rules were clearly defined and understood by all responsible parties. The results presented in Table 9 indicate only few CMHHs respondents from FDWs (Haneti, 13.1% and Bereko, 2.0%) and NFDWs (Membe, 0.9% and Kingale, 1.8%) had positive opinions that drilled wells projects' rules were clearly defined and understood by all responsible parties. The extremely low scores across the four projects imply that project rules were not clearly defined, and if at all they had been well defined, then they were not well understood by all the stakeholders.

Project rules are social and operational norms which define correct and acceptable behaviour in a society or a group to people with regard to utilisation and management of communal resource such as drilled wells project. Among the rules there are national minimum standards set by the National Water Policy of 2002, which are accessibility to safe and clean water by all citizens, water requirement per household at least 30litres per day, distance to water point within 400 m from households, and one water point to serve not more than 250 people. Understanding of the project rules is a vital component. However, compliance to those rules is the most important element for sustainability (Sharma and Ohama, 2007).

During further probing on whether the beneficiaries were willingly paying for water services, explanation from KIIs in FDWs projects confirmed that the majority of local people willingly paid for water services. Default rates and resistance to pay were minimal in FDWs, but high in NFDWs. Willingness to pay for service or product is one of important sustainability elements (Kaliba and Norman, 2004). Furthermore, it is important that community members were regularly buying water from their drilled wells projects to sustain them. Across the study villages, there was a pocket of people who regarded water as a free gift from God, and that there was no need to pay for water services, but this is

contrary to endogenous, self-help development. The implication for this is that sustainability of drilled wells projects is at risk, unless beneficiaries are utilising the water services rendered and are willingly paying for water services.

Explanation from FGDs revealed that, during the wet season (December to June), the majority of community members in FDWs projects did not buy water from drilled water wells because of availability of cheap alternative sources of water (rainwater harvests, road-side drains, sandy rivers and hand-dug shallow wells). This habit resulted into decline in revenue from water leading to unsustainable water services. More campaigns are required to sensitize the community members on the importance of using their own resource particularly piped water for ensured community health and improved livelihoods.

4.4.8 Communities have resources to cover the project costs

The study also sought to determine whether the responsible parties, especially communities, have resources to cover the project costs. The results presented in Table 9 show low proportions of CMHHs respondents from FDWs (Haneti,13.1% and Bereko, 4.2%) as well as those from NFDWs (Membe, 13% and Kingale, 8.9%) had positive opinions, that responsible parties, especially communities, had resources to cover the project costs as suggested by Rajabu (2007). These low scores across the four projects demonstrate weak capacity of stakeholders in terms of resources to cover project costs. Explanations from KIIs confirmed that financial viability of community members in the study villages depended on unstable sources of household income i.e. rain-fed agriculture, pastoralist and off-farm activities. Drilled wells could be more sustainable if the target communities had several income-generating projects so as to distribute risk. Unfortunately, in the study area, drilled wells projects were the only financial-viable projects and hence prone to out-flows of funds instead of in-flows. This is not a healthy

condition for financial sustainability of the project. In order to ensure sustainability of drilled wells projects, village governments and community groups should identify and initiate communal revenue-generating projects.

According to Ohama (2002), it is of vital importance to ensure timely availability of financial resources for maintenance of the project in sustainable and effective ways. Financial resources are required for procurement of inputs such as fuels, lubricants, spare parts, to pay water user fees, drilled well registration fee, water-test charges, water points' attendants and security guards and pay allowances to technicians during repairs. In all the four drilled well projects, financial resource for repair and maintenance came solely from the sales of water.

A proportion of community members such as cattle-rich households had financial capacity, but the question was whether they had developed self-help spirit required for voluntary contribution of resources. Drawing from KIs' explanation, cattle-rich household heads were willing to contribute especially when their animals were to benefit from the project. In light of endogenous development theory, self-help spirit is one of the most important forces for change and sustainability as it supports the growth of projects, reduces cost, improves the quality of service and reduces dependency. Explanations from FGDs show that the degree of self-help spirit varied from one project to another. At Haneti drilled well project, there was evidence that community members were highly motivated to the extent that they contributed sufficient funds to buy a new engine. On their side, Council Directors (CDs) are supposed to support community projects, but they lacked unconditional budget from which they could support community initiatives. Faty *et al.* (2012) pointed out that in reality Tanzanian LGAs perform 75% of service delivery functions with 30% of approved national budget. However, actual disbursement was 20%

of the approved budget. Nevertheless, the budget allocated to LGAs was less than TZS 3 trillion out of the total national budget of more than TZS 11 trillion in 2011/12. Local government development grant (LGDG) would be appropriate for supporting community-based development projects, but no assurance of disbursement. In 2014/15, approved LGDG was TZS 201 billion, but no disbursement was made (Faty *et al.,* 2015). Under this circumstance, it is difficult for LGAs to carry out urgently needed financial support to community-based development projects. Lack of support from the district council puts the sustainability of drilled wells projects at jeopardy. An alternative support from district council could be the drilled wells projects to generate sufficient revenue to off-set maintenance costs.

The KIs in the study area were pessimistic that the low water prices that prevailed, lack of transparency, and poor financial management led to failure in cost recovery. Compounding the matter, explanations from FGDs raised concern on lack of prior research by community to collect reliable data on output of drilled wells projects. These could serve as a benchmark for village government to make decision on the monthly returns to the village by private operators of drilled wells projects.

Results from this thesis imply that there is a need for a further study to come up with benchmark data on the output of each drilled well projects. Similarly, there is a need to strengthen unconditional budgets in the LGAs so that CDs could financially support the old and emerging CBDPs, especially at post-construction phase. Frequent backstopping in form of technical, management, capability building and organisation are necessary to empower village water committees and village governments. Moreover, there is a need to take advantage of reformed Local Government Development Grant (LGDG) to support financially those communities in need of expanding their water point network. Financial mismanagement was one of the key risks to community solidarity with village water

committees. For that matter, a particular attention should be made to ensure that there is an effective system of financial regulations and a clear auditing process in place and the entire community must be made aware of such systems. Furthermore, whereby the Central Government deploys resources to community-based development projects, it is necessary for people to be ready in terms of leadership, organisations and by-laws in villages as well as sense of ownership so that the people proactively participate even in government-initiated projects. The readiness of the people will positively affect any projects for their sustainability which will benefit both the government and the people.

4.4.9 Project ownership clearly defined

The study also sought to confirm whether the ownership of the project was clearly defined. The results in Table 9 show that CMHHs respondents from FDWs (Haneti, 33.3% and Bereko, 17.7%) and NFDWs (Membe, 13% and Kingale, 11.6%) had positive opinions that ownership of the project was clearly defined. Although the proportions are low and differ from one project to another, Haneti project expressed a better sense of ownership compared to the rest of the projects. Explanation from FGDs in Haneti drilled well project shows that beneficiaries acknowledged that the drilled wells project belonged to them. This is the important aspect in promoting practical sustainability (AusAID, 2000). Communities' evidence on ownership includes utilisation of water resource by beneficiaries, safeguarding the resource by beneficiaries, repair, maintenance of the facility and commitment to keep the resource in an operational order. Similar observations were made by Mlage (2014) based on results from investment groups. This is in line with endogenous development theory that community's sense of ownership in any communal initiative can create efficiency and accountability leading to project sustainability. Instead of waiting for the government to take action, communities should plan and implement projects using their internal resources and existing capabilities. Genuine ownership lays

the foundation for community-based management of projects and willingness to pay for operation and maintenance costs and by so doing they contribute to sustainability.

4.4.10 Flexibility in adapting to problems related to sustainability during the course of implementation

This part deals with evidence of flexibility in adapting to problems related to sustainability during the course of implementation. The results in Table 9 show that CMHHs respondents from FDWs (Haneti, 40.5% and Bereko, 5.2%) and NFDWs (Membe, 9.3% and Kingale, 8%) had positive opinions that there was flexibility in dealing with problems related to sustainability during the course of implementation. The scores differed from one project to another, and once again Haneti community members demonstrated greater flexibility in adapting to problems related to sustainability and switched to alternative options. Explanations from KIIs show that community members at Haneti have already developed some institutional linkages and communication capabilities as compared with the other three villages. The linkages and enhanced communication capabilities put Haneti community in a better position to promptly react and look for alternative solutions in case a need arose.

Flexibility is an important sustainability element, particularly in community-based development projects, because of dynamic nature of society (Howlett and Nagu, 1997). Community-based development projects are subjected to unexpected top-down policy directives from central government, technological changes, environmental and price changes. Explanation from KIIs disclosed that, before 1995, there was no flexibility as all decisions were made by the District Water Departments, but after handing over of the drilled wells projects to communities, some degree of flexibility was experienced such as management model of their choice and even the type of technology. Village governments

started with project management under VWCs and later switched to private operators, an option that was considered easy and risk free in the short run. On technology improvement, the community members in Haneti have slowly switched from British made Lister Petter engines to Chinese made engines which are cheaper, with readily available spare parts, higher fuel efficiency and easy to be repaired by local artisans. Some villages such as Bereko were considering submersible water pumps and electric motors in case they happened to be connected to the national grid system.

Flexibility can take place through reflection workshops organised on a regular basis. Reflection workshops go hand-in-hand with participatory project monitoring and evaluation (Howlett and Nagu, 1997). Reflection is effective if it is followed by community taking necessary action. In that process, the beneficiaries tend to have degree of flexibility in selecting appropriate action i.e. selection of technology. In so doing, beneficiaries are empowered through practice-action-reflection cycles of learning commonly known as *praxis*.

Besides descriptive analysis involving the ten sustainability indicators addressing objective three as discussed in subsection 4.4.1 to 4.4.10, inferential analyses were carried out to determine other factors that might be associated with respondents' opinions pertaining to social, economic and environmental factors. For that sake, inferential analysis was carried out to determine associations between selected variables and respondents' opinions about sustainability of drilled water projects. The selected variables for inferential analysis included personal characteristics i.e. education levels, age categories, marital status, sex of respondents and wealth categories. Others were situational characteristics including village and district of study.

An index summated scale was generated from10 statements measuring social, economic and environmental factors at scale of 1 to 5to measure opinions about sustainability of drilled wells projects (Appendix 1 question 3). Non-parametric tests namely Mann-Whitney U test and Kruskal-Wallis H Test were used to determine any statistically significant difference between selected variables and CMHHs respondents' overall opinions with regard to social, economic and environmental factors affecting sustainability of drilled wells projects. The non-parametric tests were used because the dependent variable did not meet normality assumption that is required in parametric tests. The independent variables were measured at nominal and ordinal levels. For that matter, non-parametric analysis was appropriate in testing group medians in the index summated scale developed from the ten statements measuring social, economic and environmental factors.

The results in Table 11 show comparison of CMHHs' overall opinions with regard to sustainability of drilled wells projects (measured by mean ranks) by their education levels, age groups, marital status, sex category, village of residence, district of residence, and wealth category.

(a) Difference in respondents' mean ranks by their education level

With respect to education, the highest mean ranks were those of College and University (238.31). Although the Kruskal-Walis H test did not show any significant difference in CMHHs respondents' opinions on sustainability of drilled wells projects by their education levels, that does not water down the importance of education level for community members, especially those who are directly responsible for daily management of the drilled wells projects. Implication for these results is that, irrespective of one's' level of education, every community member would like to have sustainable water service from their own maintained and operated drilled wells projects.

(b) Difference in respondents' mean rank by their age categories

Table 11 shows differences in CMHHs' overall opinions with regard to sustainability of drilled wells projects by their age groups. The Kruskal Wallis-H Test did not reveal significant difference in CMHHs' opinions on sustainability of drilled wells projects by their age categories ($p \leq 0.05$). However, CMHHs from active working age group (35-64 years) had more optimistic scores followed by youth age group. This discrepancy is explained by the fact that responses of adult members of community were more realistic as they were living witnesses of events related to drilled wells projects. The implication for these results is that every age group need sustainable water service from their drilled wells projects. Moreover, the members of active age group are the ones selected to become members and leaders of VWC. Hence, they feel more responsible to ensure sustainability of drilled wells projects in their villages.

(c) Difference in respondents' mean rank by their household size categories

Table 11 also shows differences in CMHHs' overall opinions with regard to sustainability of drilled wells projects by their household size categories. The Kruskal Wallis-H Test did not reveal any significant difference in CMHHs' opinions on sustainability of drilled wells projects by their household size categories ($p \leq 0.05$). Large HHs (61-90 persons) had more optimistic scores (228.14) followed by medium size HHs (206.75). Implication for these results is that irrespective of the household size, all of them need water services from their drilled wells projects on sustainable basis. Optimistic score for large HHs implies their higher demand of sustainable water services from their communally maintained and operated drilled wells projects.

Table 11: Comparison of CMHHs' respondents' opinions about sustainability of drilled wells by their personal and situational characteristics

Variables	Mean rank	df	Z	P - value
Education level				
• No formal education	193.52	4	3.94 ns	0.114
• Adult education	150.05			
• Standard I-IV	235.17			
• Standard V-VIII	201.20			
• Post primary education	201.70			
• Others (College/University)	238.31			
Age category(years)				
• 65 -90	180.97	2	3.27ns	0.195
• 35-64	207.55			
• 18 - 34	200.48			
Household size				
• Small (1 to 4)	190.28			
• Medium (5 to 9)	206.75	2	2.584 ns	0.275
• Large (10 to 22)	228.14			
Marital status				
• Married	204.63	1	-1.177 ns	0.239
• Single	191.69			
Sex				
• Male	203.90	**1**	-0.999 ns	0.318
• Female	189.95			
Village				
• Haneti	342.07	3	201.474***	0.001
• Bereko	155.91			
• Membe	216.76			
• Kingale	116.86			
District				
• Chamwino	271.58	**1**	139.917***	0.001
• Kondoa	134.88			
Wealth category				
• Low wealth group	196.88	2	0.709 ns	0.702
• Medium wealth group	204.00			
• High wealth group	214.14			

Key: ns = non-significant; * = significant at $P \leq 0.05$; *** = significant at $P \leq 0.001$

(d) Difference in respondents' mean rank by their marital status

As indicated in Table 11, Mann-Whitney U Test did not reveal any significant difference in CMHHs respondents' opinions on sustainability of drilled wells projects by their marital status. Yet, married respondents had higher mean ranks (204.63) compared to single respondents (191.69). Implication for these results is that whether married or single every community members need sustainable water service. The optimistic higher mean ranks for

married respondents reflect their stronger desire to have sustainable water services from their communally maintained and operated drilled wells project to cater for their larger household as compared to single respondents. Married couples tend to have children and extended family members who need water services on continuous basis.

(e) Difference in respondents' mean rank by their sex category

As indicated in Table 11, Mann-Whitney U Test did not reveal any significant difference in CMHHs respondents' opinions on sustainability of drilled wells projects by their sex category. Males had higher mean ranks (203.9) compared to females (189.95). However, the results did not refute the fact that participation of both men and women in management of drilled wells projects is necessary. Women are key stakeholders for ensured sustainability since they suffer more than men when the drilled wells are not functional. When given chance women tend to be better organised than men as it was reported by Suzuki (2014) from a research result conducted on women organisations in Paraguay.

(f) Difference in respondents' mean rank by their villages of residence

The result from Kruskal Wallis-H Test U Test revealed that there were statistically significant difference CMHHs' opinions on sustainability among respondents living in different villages of study ($p \leq 0.001$). The CMHHs respondents from Haneti village had highest mean rank (342.07) implying higher optimism for sustainability of their drilled well project compared to the other villages; Kingale had the least mean rank (116.86). The differences observed across the drilled wells projects can be explained by varying levels of experience-based-learning that lead to accumulated experience for managing communal projects between the study villages. The study villages were not homogenous; they varied significantly because each community was different in terms of social, political, economic, cultural and environmental context (SPECE), as well as experience in collective actions. For instance, drawing from views gathered from FGDs and KIIs, community members at

Haneti village, had accumulated sufficient experience of managing common assets over a long time. To cite some few experiences, Haneti community members had accumulated experience of making their own feeder roads at *hamlet* level, Chaco dam, and shallow wells. Hence community members of Haneti village tended to learn from their past experiences whether positive or negative, in order to improve the service delivery. Moreover, the village is located along Arusha-Dodoma highway; hence it has higher chances of getting information through frequent visits by various stakeholders as compared to Membe and Kingale villages. Furthermore, Village Government officials and VWC members went for study visit to Mpwapwa District (horizontal learning) in successful drilled wells projects. Hence, they were well exposed to alternative ideas on how to manage communally managed assets such as drilled wells projects since "seeing is believing". Similarly, in Haneti village, there was a high diversity of ethnic groups compared to the rest of the villages. Different ethnic groups bring in new experiences, ideas, skills and networking potentials, which are necessary for sustaining the community projects.

(g) Difference in respondents' mean rank by their districts of residence

The findings in Table 11 show that CMHHs respondents' opinions about sustainability of drilled wells projects, based on Mann-Whitney U Test results, were significantly different at the 0.1% ($p \leq 0.001$), implying social, economic and environmental factors affecting sustainability of drilled wells projects are location specific. Each district is different in terms of self-help community initiatives, self-organising capability, degree of people's participation in development projects and networking skills. Chamwino had limited water sources compared to Kondoa; hence community members had developed positive outlook of life and sense of self-help than dependency on eternal agents. People with positive life outlook when faced with adversity may come up with better coping strategies (Segerstrom, 2006).

(h) Difference in respondents' mean rank by their wealth categories

Contrary to expectation of the researcher, the findings in Table 11 suggest that opinions with regard to sustainability of drilled wells projects did not differ significantly by wealth categories of the respondents. The explanation for this is that, although community members had wealth, but willingness to share or contribute that wealth in order to sustain communal drilled wells projects could not be guaranteed. Yet, irrespective of someone's wealth status, all community members need to be served by functional drilled wells projects on sustainable basis due to the importance accorded to water as a basic necessity for all human beings.

Apart from personal and situational characteristics of respondents in Table 11, differences in CMHHs' opinions on functional status of drilled wells projects by social, economic and environmental factors were determined. The results are presented in Table 12. Moreover, the results revealed that social factors were more associated with respondents' opinions pertaining to functional status of drilled wells projects than environmental and economic factors. Mann-Whitney U Test revealed the highest mean rank with FDWs projects (240.82) as compared to the mean rank of NFDWs projects (167.51), ($p \leq 0.001$). As expected, although economic factors such as resource supply are important, their mean ranks, FDWs (225.53) and NFDWs (180.02), were low.

Table 12: Difference in CMHHs' opinions on functional status of drilled wells projects by their social, economic and environmental factors

Variables	Mean ranks		Z	P value
Respondents' opinion on:	FDWs	NFDWs		
Social factors	240.82	167.51	-6.330	0.001***
Economic factors	225.53	180.02	-3.976	0.001***
Environmental factors	237.87	169.93	-6.108	0.001***

The results in Table 12 revealed the importance of establishing a strong social base prior to initiation stage and making use of those social values, norms and peoples' experience to manage community-based projects. That means. it is worthy giving priority to social factors (awareness building, formation of norms, compliance to rules and regulations, capability building, strengthening of community organisations, institutional linkages and effective facilitation) before embarking on complex community-based project such as drilled wells projects. If these aspects could be mainstreamed in the project cycle, the likelihoods of sustaining CBDPs would increase, consequently improving livelihoods of the beneficiaries. The results were strongly supported by Sharma and Ohama (2007), that if projects that are resource-oriented without balanced consideration of social aspects which forms the foundation, those kinds of projects have little likelihood to be sustainable. By supplying resources alone or ready-made projects to communities without strong social foundation, the communities will be stuck, as they lack necessary knowledge, attitude, experience and skills.

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

This Chapter presents summaries of findings, conclusions and recommendations made with regard to the sustainability of drilled wells projects. Several key lessons were learned following the findings obtained regarding sustainability of drilled wells projects in Kondoa and Chamwino district of Dodoma region. These lessons are important because of their policy implication in improving sustainability of drilled wells projects in the study area. The conclusions and recommendations drawn are focused on addressing the study objectives.

5.1 Summary of Study Results

Objective one (factors affecting community-based drilled wells projects initiative process) essentially ascertained whether the drilled wells projects were properly planned during project initiation phase. The results in Table 6 revealed that essential and compulsory aspects in project initiation process to great extent were neglected especially in NFDWPs as compared to the FDWPs. The drilled wells projects were initiated blindly without a clear understanding by all stakeholders on the prevailing local context which would lead to negative consequences during implementation and post implementation phase in terms of sustainability. For instance, it was necessary to assess local sustainability in order to understand beneficiaries' attitude towards the project, people's expectations, whether local communities (beneficiaries) would be able to contribute locally available resources, skills and their experience. It was important to understand community' readiness and willingness to pay for water service to sustain the projects after with draw of donor. It was necessary to establish stakeholders' concurrence so as to understand the roles and functions of donors, national level stakeholders, district level stakeholders, local level

stakeholders (ward, village, hamlet); and the beneficiaries themselves before implementation of the planned projects. Consensus should have been reached pertaining to location of projects, distribution of water points to all hamlets and how the projects would be operated in future for sustainability purpose. It was also necessary to appoint local sustainability champion, a development oriented leader who would act as contact person, link and motivator of the local community towards realisation of sustainable project. It was profoundly important for local community to identify the sources of help and necessary support to sustain the project after the donor support ended.

It was also necessary to incorporate sustainability into local policy by formulation and enforcement mechanism that would ensure the defaulter are sanctioned hence to ensure sustainability of their planned project. The results suggest that the projects initiated without clear understanding of existing reality have very little chance to be successful implemented and get sustained after the donor is gone. However, initiation was location specific. Opinions of responds show initiation of the two FDWPs underwent slightly better process compared to NFDWPs. Even within the FDWPs, opinion from Haneti village respondents revealed that it underwent a more rational process than Bereko village. The results imply that initiation process of drilled wells projects was guided by the modernisation and growth oriented theories of the 1950s to the 1990s, which put much emphasis on resource supply as means to improve growth.

Pertaining to objective two (extent of stakeholder participation in different stages of project) essentially during initiation, implementation and sustainability stages. The study shows that stakeholders for the drilled wells projects were at donor, national level, district level and beneficiary level. The results in Table 8 revealed that FDWPs had slightly higher scores than NFDWPs. The scores within the FDWPs suggest that in Haneti village there was greater extent of stakeholder participation compared to the rest due to location

advantage. The role of donor was to supply financial resources for constructing the drilled wells; national level stakeholders (Ministry of water, drilling agency, water laboratory) provided policy guidance, technical expertise in construction and water quality assurance. District level stakeholders operated the drilled wells for many years before handing over to beneficiaries. Project activities were not implemented as per agreement and expectation of beneficiaries hence, the projects were implemented below standard. For instance, at Kingale village the implementers did not take into consideration local knowledge with regard to location point during drilling resulting to water which was too salty for human consumption. At Membe village only one water point was constructed and it was too far for most hamlets to access the service, hence resorting to alternatives sources. Worse still as observed in objective one the beneficiaries were not fully engaged in planning stage.

Mover over the government plan was to build and operate the projects hence the beneficiaries were not psychologically prepared to contribute towards the project. In view of above it is important to note that degree of people's participation in a project depends on whether the project is directly related to their problems and whether people proactively are engaged in planning process. You cannot expect high level of people's participation in a project if it does not meet peoples' felt-needs and genuine participation in planning process. Poor planning and implementation of community development projects lead to negative results in sustainability stage.

With respect to objective three analysed (social, economic, and environmental factors influencing sustainability) essentially after donor support has ended. The purpose was to assess overall factors influencing overall initiation process, implementation process and sustainability phase because proper initiative process leads to effective implementation and finally to sustainable projects. The results on respondents' opinion show that FDWPs

had slightly higher scores than NFDWPs. Correspondingly; social factors had more influence on sustainability compared to economic and environmental factors. At the stage of sustainability all stakeholders were involved except donors. As indicated in discussion section the stakeholder at district level (District water departments) operated the project and provided water services free of charge. At late stage projects were handed over for community to operate and members to cover recurrent cost through revenue collected from water users. These arrangement were not clearly defined during planning stage to enhance long term commitment of each stakeholder. National policy statements on responsibilities of each stakeholder were not effectively communicated hence beneficiaries were not fully prepared to take over the projects.

The role of district stakeholders was to provide repair services but using the water revenue. The results implies that there was no clear mechanism formulated from beginning that defines how the project would sustained after donor support has ended taking into consideration that 88% of water projects were donor funded. It was found that poor commitment of district water departments, some village leaders and village water committees was a barrier toward sustainable drilled wells projects. They misused water revenue to extent that it was not easy repair the broken facilities. The last resort was to adopt private operators in operation and maintenance. But private operators were profit oriented hence they had no motive to expand water points. In view of above it was rather difficult to sustain the drilled wells projects.

In light of endogenous development theory, the findings support the theory in the sense that for community-based development projects to be sustainable, it is not the only resource delivery such as construction of the drilled wells projects that matter most, but the endogenous process of initiating those projects; self-reliance, capability of community

members and their organisations, and ability of community to network with other institutions in order to benefit from mutual social relations among stakeholders. Hence, the reason why many of the drilled wells projects become unsustainable is not only because of technical issues, but sustainability is related to degree of indigenousness nature of those projects, management, social relationships and the prevailing community dynamics.

5.2 Conclusions

5.2.1 Factors affecting community-based drilled wells projects initiative process

The findings show that initiative process is location specific depending on existing local context. In this study the essential aspects in project initiation process i.e. local sustainability assessment, concurrence of stakeholders, to great extent were neglected especially in NFDWPs as compared to the FDWPs. The drilled wells projects were initiated blindly without a clear understanding by all stakeholders on the prevailing local context. The drilled wells projects were initiated focussing mainly on supplying resources inform of hardware.

5.2.2 Extent of stakeholders' participation in community-based drilled wells projects

The study shows that stakeholders for the drilled wells projects were at donor, national level, district level and beneficiary level. The findings show that project activities were not implemented as per agreement and expectation of beneficiaries hence, two out of four projects were implemented below standard. The findings also show that there was no effective genuine participation of key stakeholders (community members) especially at planning and implementation stages of the four drilled wells projects in study area. Rather, there was "tokenism" participation whereby people were told about the drilled wells projects that were designed and implemented National and district level stakeholders (Ministry of Water). Some of projects (Kingale and Membe) did not meet people felt-needs and people were not proactively engaged in planning process.

5.2.3 Social, economic and environmental factors influencing the sustainability of drilled wells projects

The findings show that although there was slightly higher scores on FDWs compared to NFDWs, generally in both groups the scores were below 50%. Also, the findings show that sustainability of community-based development drilled wells projects was more associated with social factors related to management, social relationships and community dynamics rather than economic and environmental factors. For instance there was no effective mechanism formulated as exit strategy defining how projects would be sustainable after donor assistance ended. When donor support was withdrawn the projects were handed over to communities to operate them without sufficient social preparations, experience, moral and material supports.

5.3 Recommendations

Based on the study findings and conclusions, the following recommendations are put forward in order to increase chances of sustainability of drilled water wells in Dodoma and probably elsewhere in Tanzania with more or less circumstances as those of Dodoma. The recommendations specify not only the levels at which strategies to improve sustainability should be addressed, but also the key stakeholders that are urged to take a lead in undertaking the strategies.

5.3.1 Policy recommendations for enhancing community-based drilled wells projects initiative process

On the basis of the conclusion that the drilled wells projects were initiated without clear understanding of prevailing local context approach, focussing mainly on supplying resources in form of hardware, it is recommended that donors and government before inputting resources, it is essential to ensure that social setting in terms norm and

organization to manage those resources are ready. Efforts should be made to ensure community initiatives are sufficiently mobilised right from the design stage of the projects. All important steps in project cycle should be adhered to starting with: sustainability assessment, designating the project champion, creating project vision, roadmap, and monitoring indicators. Sustainability should be incorporated into local policy, sources of help identified, the projects implemented and progress monitored by the beneficiaries.

5.3.2 Policy recommendations for enhancing stakeholders' participation in different stages of selected community-based drilled wells projects

On the basis of the conclusion that there was no effective genuine participation in the four drilled wells projects in Kondoa and Chamwino districts, it is recommended that in order to sustain community-based development projects, government agencies and donors' focus should encourage genuine participation of key stakeholders through concrete community initiatives right from the beginning of project. Stakeholders should ensure that project should produce quality services addressing the felt need and that the services are accessible to beneficiaries. It is impossible to expect the government to do everything alone to satisfy all the diversified needs of the people. People should be the main actors and the government is the supporter. In Tanzania, it is our tradition that people unite themselves and make self-help efforts to improve their well-being. This is a wonderful asset of our country and that community development projects can be effectively and efficiently implemented by the government through this tradition.

5.3.3 Policy recommendations social, economic and environmental factors affecting community-based drilled wells projects

On the basis of conclusion that sustainability of community-based development drilled wells projects was more associated with social factors related to management, social relationships and community dynamics and that there was no effective mechanism to

ensure sustainability after donor assistance ended it is therefore recommended that:

(a) All stakeholders including the community, LGAs and private sector, should establish strong collaborative relationship and cooperation among themselves in order to sustain the drilled wells projects.

(b) LGAs and donors should facilitate the communities to ensure that critical factors to sustainability are addressed through continuous capability building so that when communities are empowered they can plan, implement and cultivate sense of ownership of their development projects. By so doing they will ensure social, economic and environmental sustainability of development projects.

5.4 Major Contributions of the Study

(a) The study findings inform the debate on reconciling between conventional top-down and bottom-up approaches in the process of initiating community-based projects. Central government has strategically intervened and is likely to continue doing so, while at the same time through D by D, Tanzania is encouraging a bottom-up participatory approach as discussed in this thesis, then there must be a mechanism to balance and accommodate both approaches. From theoretical perspective, the study results have challenged the growth oriented theories which propagate dependency and call for stakeholders to promote endogenous development emanating from the local people in order to sustain their initiatives

(b) The study findings inform project planners on the need to think beyond community priorities rather, community initiatives should form the basis for supporting community-based-development projects. By addressing the wish-list of communities won't empower the target communities; neither will it sustain the resulting projects. Conversely, by supporting community initiatives (activities which the communities

that have started or showed willingness to implement by themselves using their locally available resources), there is higher potential to sustain those initiatives.

(c) The study findings provide information on the establishing strong collaborative relationship between LGAs, communities and local private sector. This is because government alone or community alone cannot solve all the community felt problems. A mutual understanding and collaborative relationship is required between all involved parties in order to sustain community-based projects.

5.5 Suggestions for Further Research

The study did not cover the influence of traditional institutions and norms because initially it was not considered important in the study area. Experience gained during the study period shows there is a need on the influence of customary institutions and traditional norms to sustainability of CBDPs. The study covered only the mechanically drilled wells fixed with motorised pump. It is suggested that follow-up studies could look on the sustainability patterns of traditional hand-dug boreholes in the study area, since most of community members rely on those types of facilities.

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APPENDICES

Appendix 1: Questionnaire

- ***Confidential***
- Questionnaire: Personal interviews
- Respondent: Community members Household heads
- Study topic: Sustainability of community-based drilled wells projects in Dodoma Region
- Region……District……..……Division……..…. Ward ……Village.…… … Hamlet …….
- Name of selected drilled wells project …… (Functional / Frequently break down/ Non-Functional)
- Respondent No ……Date ……

1.0 Community members' household heads characteristics

1.1 Personal characteristics

1.1.1 Age ……. (Years)

1.1.2 Sex …… (Male / Female)

1.1.3 Marital status …….(Single / Married /Widowed/ Divorced)

1.1.4 Size of Household ……

1.1.5 Education (Tick) Final level obtained

Education	(Tick) Final level obtained
None	
Adult Literacy	
Std IV	
Std V-VII/VIII	
Post primary	
Others (Specify)	

1.1.6 Where you born in this village? ……. (YES /NO)

1.1.7 If NO in Q 1.1.6 above, for how long have you lived in the village …… (Years)

1.2 Situational characteristics

1.2.1 Does your household own any farm land? …….. (**YES /NO**). If **YES,** how many acres ……and how much is used for farming activities …….(Acres)

1.2.2 Do you have livestock? **YES/NO** …….. If **YES**, what type of livestock do you own?

Type of livestock	Number
Local Cattle	
Improved cattle	
Donkey	
Goats	
Sheep	
Pigs	
Chicken/ducks/guinea fowl	
Others (Specify) …..	

1.2.3 Do you engage in any off-farm activities?.....**YES/NO.** If **YES, indicate** type of off-farm activities you are engaged in.

Type of off-farm activity	**Yes**	**NO**
Local brew		
Employment		
Selling water from our community well		
Business		
Others (Specify) ….		

1.2.4 Have you ever been involved in …… (**Name of identified project**) community-drilled wells project which has been implemented in this village since …… (Years). If **YES**, who started the project? ……; and how many years has the project been implemented by the community without donor support?..... (years).

1.2.5Has the project attained all the intended objectives**? …….. YES / NO.**

1.2.6 If **YES** to above, does the project mentioned in Q 1.2.5 cover at least 50% of the village population? ……**YES/NO.**

1.2.7 Was the project implemented by local institution at local authority level? **YES / NO.**

1.2.8Anddoes it has at least 75 percent of facilities operational order?..... **YES/NO**

2.0 Factors affecting sustainability of community-based drilled wells projects initiative process

Statement	Level of Agreement*				
	SD	D	N	A	SA
• Local sustainability assessment conducted					
• Stakeholders concurrence obtained					
• Local sustainability champion designated					
• A vision created					
• Roadmap for reaching the vision developed					
• Sustainability indicators developed					
• Sustainability incorporated into local policy					
• Sources of help identified					
• The project carried out					
• Progress checked					

*SD= Strongly disagree; D= Disagree; N= Neutral; A= Agree; SA= Strongly agree

3.0 The extent of stakeholders' participation in different stages of selected community development projects

Statement	Extent of participation*		
	N	L	GE
• National agency actions manifest a long-term commitment to project goals			
• There is national policy statement that clearly defines the respective responsibilities of government, the community, and the private sector arrangement for providing supplies			
• Community project committees or key individuals are confident of managing the project facilities and related activities			
• More women are serving on the project committee and participating in activities than before the project began			
• Committee members were given a voice and vote in all aspects of the project cycle			
• Project committees do participate in project management and financial decisions			
• The project was managed within the existing institutional structure to facilitate continuation of activities after it ended as opposed to creating a special project organisation			

*N = Never; LE = Limited Extent; GE =Great Extent

4.0 Social, economic and environmental factors influencing the sustainability of community-based drilled wells projects

Statement	Level of satisfaction*				
	NS	**SS**	**MS**	**VS**	**ES**
1. Users are satisfied with service provided and content to see no changes					
2. Trained professionals are available to maintain and repair the facilities					
3. Supplies are available and system of their distribution					
4. There is evidence of positives behaviours related to hygiene					
5. The communities do receive information about the project through the media or extension agent					
6. Communities have adequate communication channels with government agencies and private sector to express community needs					
7. Project rules are clearly defined and understood by all responsible parties					
8. The responsible parties have resources to cover the project costs					
9. The ownership of the project is clearly defined					
10. There was evidence of flexibility in adapting to problems related to sustainability during the course of implementation					

*NS = Not satisfied at all; SS = Slightly satisfied; MS = Moderately satisfied; VS = very much satisfied; ES = Extremely satisfied.

Appendix 2: Key informants' checklist

KEY INFORMANTS CHECK LIST

- ***Confidential***
- Checklist
- Respondent: Key informants
- Study topic: Sustainability of community-based drilled wells projects in Dodoma Region
- Region……..…District……..……Division……..……..….Ward ……Village..…….
- Name of selected drilled wells project …… (Functional / Non-Functional)
- Respondent No……. Date ……

✓ **What are the factors affecting sustainability of community-based drilled wells projects initiative process**

…….

…….

✓ **To what extent was the stakeholders' participation in different stages of selected community development projects**

…….

…….

✓ **What are the social, economic and environmental factors influencing the sustainability of community-based drilled wells projects**

…….

…….

Appendix 3: Focus group discussion guide

- Community initiative process for drilled wells projects
- Extent of community participation in drilled wells projects
- Effectiveness of local policies in drilled wells projects
- Local institutional issues in drilled wells projects
- Local administration issues in drilled wells projects
- Capability building in drilled wells projects
- Social, economic and environmental factors influencing sustainability of drilled wells projects

Appendix 4: Wealth ranking in Kondoa and Chamwino districts

(a) Kondoa villages

High wealth group		
Criteria	**Bereko village (with Function drilled well)**	**Kingale village (with non-function drilled well)**
Number of cattle owned	20 and above	20 and above
Acres of land owned	10 and above	10 and above
Household food situation	Enough food/grain and excess	Enough food and excess
Farm equipment owned	Ox-plough	More than one ox-plough
Type of House	Modern, bricks and corrugated iron sheet, solar panel	Modern, bricks and corrugated iron sheet
Business ownership	Milling machine/kiosk	Milling machine/kiosk
Type of school and levels of education attained by their children	Good/private schools up to university level	Good/private schools up to university
Labour status	Hires casual labourers	Hires casual labourers
Type of transport owned	Motor cycle/bicycle	Motor cycle/bicycle/tricycle
Percent	**14**	**11**
Medium wealth group		
Number of cattle owned	2 – 5	5 - 10
Acres of land owned	3 – 5	5 - 8
Household food situation	Enough food	Enough food
Farm equipment owned	Hand hoe	Ox-plough
Type of House	Bricks/mud corrugated iron sheet but local roof	Bricks/mud corrugated iron sheet but local roof
Business ownership	No business	No business
Type of school and levels of education attained by their children	Ward/normal schools but some reach university	Ward/normal schools but some reach university
Labour status	Work with labourers	Work with labourers
Type of transport owned	Bicycle	Bicycle
Percent	**22**	**32**
Low wealth group		
Number of cattle owned	No livestock	Have 5 goats no cattle
Acres of land owned	0 – 2	0 – 5
Household food situation	Suffer from food shortage every year	Suffer from food shortage every year
Farm equipment owned	Hand hoe	Hand hoe
Type of House	Mud/poles and gasses	Mud/poles and thatched with grass
Business ownership	No business	No business
Type of school and levels of education attained by their children	Primary school	Ward schools up to secondary school
Labour status	Hired as casual labour	Hired as casual labour
Type of transport owned	No means of transport	No means of transport
Percent	**62**	**57**

(b) Chamwino villages

High Wealth group		
Criteria	**Haneti village (with function drilled well)**	**Membe village (with non-function drilled well)**
Number of cattle	40 and above	10 and above
Acres of land	10 and above	10 and above
Food situation	Enough food and excess	Enough food and excess
Argo-mechanisation	Ox-plough/tractor	Ox-plough
Type of house	Mud/poles and grasses	Bricks/mud and corrugated iron sheet local design roof
Business	Selling and lending food and livestock *(songoleda*)	Milling machine/kiosk, *songoleda*
Labour	Hires labour	Hires labour
Transport	Motor cycle/bicycle ownership	Motor cycle/bicycle ownership
Percent	**16**	**9**
	Medium wealth group	
Number of cattle	1 – 20	1 - 9
Acres of land owned	2 – 5	3 - 9
Food situation	Enough food throughout the year	Enough food throughout the year
Agro-mechanisation	Ox-plough	Ox-plough
House type	Mud bricks, corrugated iron sheet but local roof	Mud bricks, corrugated iron sheet but local roof
Business	Lend food (*songoleda*)	Kiosk/restaurant
Type of school for their Children	Ward schools up to secondary school	Ward schools up to secondary school
Labour availability	Work with labourers	Work with labourers
Transport	Bicycle	Bicycle
Percent	**30**	**25**
	Low wealth group	
Number of cattle	Has poultry 5-15	Has poultry 1-10
Acres of land owned	0 – 1	0 - 2
Food situation	Food shortage every year, in debt often (borrow food through *songoleda*)	Food shortage every year, in debt often (depend on *songoleda*)
Agro-mechanisation	Hand hoe	Hand hoe
House	Mud/poles and gasses	Mud/poles and gasses
Business	No business	Local brew
Children school	Ward schools up to secondary school and are treated in the hospital	Primary school
Labour	Hired as casual labour	Hired as casual labour
Transport	No means of transport	No means of transport
Percent	**54**	**66**

NB: *Songoleda* is traditional credit system among Wagogo in Dodoma region, involving mainly the grains with 100% interest rate**.**

Appendix 5: Description of drilled wells projects covered in the study

	Name of drilled well projects			
Attributes	**Haneti**	**Membe**	**Bereko**	**Kingale**
Year constructed	1958	1976	1976 major repair1998	1976
Sponsor	Tanganyika Government	URT	URT	URT
Depth (m)	70+	70+	70+	70+
Number of Hamlets	15	10	6	8
Hamlets connected	7	1	4	4
Number of water points	9	1	5(public), 5 (private)	4
Location of the project	Valley bottom, alluvium soils, along the flood drain	Valley bottom, alluvium soil, close to a seasonal river	Valley bottom	on a plateau, saline aquifer
Pump type	Mono pumps	Mono pumps	Mono pumps	Mono pumps
Engine type	Chinese/petrol engine Spare Lister Peter	Chinese/petrol engine	A Lister Peter single cylinder diesel engine	A Lister Peter single cylinder diesel engine
Management	Private Operator/weak VWC	Private Operator/ weak VWC	Village Government/VWC resigned	Private Operator previous year)
Water Basin Registration	Wami-Ruvu Basin/	Wami-Ruvu Basin	Wami-Ruvu Basin /Internal drainage	Wami-Ruvu Basin
Water taste	Mild saline	Mild saline	Mild saline	Extremely saline
Operational status	Functional	NF-for past 3 months	Functional	NF-for past 12 months

NB: NF = not functional; VWC= village water committee

Appendix 6: List of stakeholders and their roles in drilled wells project

Name of stakeholder	Roles and functions	Their participation in drilled wells projects
Community members	To make a cash contribution towards capital costs and contributed time and labour, local materials and hospitality for visiting government staff. Also, to undertake hygiene education and serve on health committees.	Contributed time and labour, local materials and hospitality for visiting government staff
Local Government Authority (Water Department and WAMMA)	Supportive supervision: Financial, technical, legal, managerial and moral support	No financial support Technicians are paid by water funds. Limited legal support
Ministry of Water and Irrigation	To ensure that water resources are managed in an integrated manner, water is adequately supplied with acceptable quality to meet requirements of different sectors thereby enabling them to contribute to the national development	Water policy of 2002 Water use regulations
Drilling and Dam Construction Agencies (DDCA)	To carry out feasibility studies concerning groundwater projects, design and construction of dams as well as design and construction of water supply systems. During implementation of the projects the Agency provides technical advice and any other advice required for sustainability of the project	Water borehole drilling
Maji Central Stores	Provision of specialized water related materials and equipment of high quality, at reasonable price and time delivery for development and maintenance of Urban and Rural Water project.	Their role was not noticed in drilled wells projects
Water Development and Management Institute	Training of water technologists, technicians and artisans in water sector development and management required for construction, operation and maintenance of water and sanitation projects.	Supply water technicians and pump mechanics
The Energy and Water Utilities Regulatory Authority (EWURA)	It is responsible for technical and economic regulation of the electricity, petroleum, natural gas and water sectors in Tanzania.	They had no role in tariff setting mechanism of drilled wells projects
Basin Water Boards	To manage and protect the minimum available water resource. Integrated water resources management that will ensure the sustainable use of water which will minimize the consequences which might result from improper use of the resource. To combat the effect of climatic change.	Issuance of water use right Charging water user fee
Water Quality Laboratory	Biological and chemical analysis of water	Their role is not continuous
International Donors	Major donors who financed the drilled wells projects in Tanzania are: Water Aid, French, UK (DFID), USA (USAID and MCC), African Development Bank, the European Commission, Germany (GIZ), the Netherlands and the World Bank. Other donors include AFD, Japanese JICA, Belgium(LVIA), Switzerland, Germany, and the Dutch government contribute to the WSDP Basket Fund which is a form of a Sector-Wide Approach	About 88% of the projects funds were provided by external donor organisations.
Local private sector	Supply of spare parts and repair or maintenance of water system	Operating the drilled wells projects and Supply of spare parts. However, Local artisans were restricted from maintenance of drilled wells system

Source: Compiled from website of Ministry of Water and Irrigation (2016).

Appendix 7: Policy Documents relevant to Sustainability of Drilled Wells Projects

Policy statements	Objectives
National Water Policy of 2002	to develop a comprehensive framework for sustainable development and management of the nation's water resources and putting in place an effective legal and institutional framework for its implementation
	To ensure that beneficiaries participate fully in all stages of water resource development.
	To ensure integrated Water Resource Management approach in Tanzania so that "there is equitable and sustainable use and management of water resources for socioeconomic development, and for maintenance of the environment".
	To ensure sustainable conservation and utilization of the water resources.
National Water Sector Development Strategy – 2006 to 2015	To address cross-sectoral interests in water, watershed management and participatory integrated approaches in water resources planning, development and management;
	To lay a foundation for sustainable development and management of water resources in the changing roles of the Government from service provider to that of co-ordination, policy and guidelines formulation, and regulation;
	To ensure full cost recovery in urban areas with considerations for provision of water supply services to vulnerable groups through various instruments including lifeline tariffs; and
	To ensure full participation of beneficiaries in planning, construction, operation, maintenance, and management of community based domestic water supply schemes in rural areas.
Five-year development plan (FYDP – II) 2016/17 -2020/21)	Objective 6, which seeks to improve quality of life and human wellbeing, and
	Objective 8, which seeks to intensify and strengthen the role of local actors in planning and implementation
Public-private partnerships (PPP) policy of 2009	To develop an enabling legal and institutional framework to guide investments in PPPs;
	To implement effective strategy showing specific obligations and rights for various stakeholders;
	To introduce fair, equitable, transparent, competitive and cost-effective procurement processes for PPPs
	To adopt operational guidelines and criteria for PPPs;
	To attract resources for development of PPPs;
	To develop institutional capacities for technical analysis and negotiation of PPPs and associated contracts; and
	To enhance efficiency and quality in implementation of PPPs.

Source: Compiled from website of Ministry of Water and Irrigation (2016)

Appendix 8: Water Point Status in Dodoma Region 2013

LGA	Total water points	Functional water points	Water points Need repair	Non-functional	% of non-functional water points
Bahi DC	280	200	0	80	28.60
Kondoa DC*	644	275	120	249	38.70
Chamwino DC	439	182	31	226	51.15
Dodoma urban	467	117	43	307	65.74
Kongwa DC	460	263	0	197	42.80
Mpwapwa DC	490	251	50	189	38.57
Total	**2780**	**1288**	**244**	**1248**	**44.89**

*=Kondoa DC before subdivision into Kondoa DC and Chemba DC

Source: [wpm.maji.go.tz] 20137