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SCHOOL OF GRADUATE STUDIES

FACTORS AFFECTING SUSTAINABILITY OF WATER SUPPLY PROJECT:

THE CASE OF CHEHA DISTRICT, GURAGE ZONE, ETHIOPIA

BY

DESALEGN LEJIBO MITORE

JANUARY, 2018

ADDIS ABABA, ETHIOPIA

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A THESIS SUBMITTED TO SAINT MARY'S UNIVERSITY  
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MANAGEMENT

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BOARD OF EXAMINERS:

As members of the board of examiners the final MA Thesis open defense examination we certify that we have read and evaluated the thesis prepared by **Desalegn Lejibo Mitore** and examined the candidate.

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## ENDORSEMENT

As thesis research adviser I hereby certify that I have read and evaluated this thesis prepared under my guidance, by **Desalegn Lejibo Mitore**, entitled “factors affecting sustainability of water supply project in Cheha Woreda Gurage Zone, Ethiopia” and I recommend that it be submitted fulfilling the thesis requirement.

Adviser: Tesfaye Wolde (PhD)      Signature\_\_\_\_\_ Date\_\_\_\_\_

## DECLARATION

I declare that this thesis is my original work and has never been presented in any other universities hence all resources in this study have been duly acknowledged.

Researcher: DESALEGN LEJIBO MITORE Signature \_\_\_\_\_ Date \_\_\_\_\_

## DEDICATION

I dedicate this thesis to Ethiopian Kaleheywet Church development commission which covered education cost and allocated time in my MA study duration.

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## Lists of Abbreviation/Acronym

- 1 ACF: Action Contre la Faim (France Technical Department of WASH)
- 2 CAWST: Center for Affordable Water and Sanitation Technology
- 3 GTP I : Growth and Transformation Plan First Phase
- 4 GTP II: Growth and Transformation Plan Second Phase
- 5 IRC: International Water and Sanitation Centre
- 6 O&M: Operation and Maintenance
- 7 SNNPR: Southern Nations, Nationalities and People's Regional State
- 8 WASH: Water, Sanitation and Hygiene
- 9 WASH.com: Water, Sanitation and Hygiene Committee
- 10 WHO: World Health Organization
- 11 SDA: (Strongly disagree), DA: (Disagree,) UD: (Undecided), AG :( Agree), SAG:  
(Strongly agree)

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## **Abstract**

*A descriptive cross sectional entitled factors affecting sustainability of water supply project study was done in Gurage zone Cheha Woreda in January 2018. Both quantitative and qualitative approaches were included in interviewing 265 head of household respondents using structured survey questionnaire and 3 key informants from district water and energy office using open ended discussion questions. The objective of the study was to evaluate and realize factors affecting sustainability of water supply project and to provide inputs though possible recommendation in Gurage zone Cheha Woreda. The finding of Pearson correlation shown that independent variables such as, community participation, project financing, project organization management practices and community training have positive relationship at (.042, .035, .273<sup>\*\*</sup>, .358<sup>\*\*</sup>) respectively and their P value at confidence level of ( $P < 0.01$ ) for organization and management practices indicates that  $p = 0.00$  and  $p = 0.00$  respectively and the p value for community participation and project financing at confidence level of ( $P < 0.01$ ) indicates that .496 and .572 respectively. The finding of linear regression also indicated that adjusted R square value was 0.142 which indicates low degree of goodness of fit meaning that about 14.2% of the variance on the dependent variable i.e. project sustainability can be explained. The coefficient result indicated that community training and organization management had t-test result= 4.94, sig= 0.001 and t-test result= 2.88, sig= 0.004 respectively. This indicates that both community training and organization management were statistically significant at  $P < 0.05$  level.*

**Key words: water supply project sustainability, community participation, project financing, organization management and community training.**

# CHAPTER ONE

## INTRODUCTION

The human right to water and sanitation was recognized by the United Nations General Assembly and the Human Rights Council in 2010 (Nathaniel Mason, Mariana, Matoso, William, Simith, 2015)

According to national water, sanitation and hygiene inventory conducted in 2010-2011 the one WASH national program and the national WASH inventory has contributed to bringing the sector silos towards an integrated WASH planning and monitoring system, which has a substantial role in identifying sustainability of WASH projects. The report goes on to state that the water supply outputs of the projects were affected by weak coordination among the three sector ministries (water, health and education) at all levels and weak monitoring system and clarified lack of sustainability in WASH projects. According to first growth and transformation program WASH performance report (GTP 1) water supply achievement in access was 84.5% against planned 98% and sanitation hygiene coverage reported as 83.9 with unknown percentage planning (7<sup>th</sup> annual multi-stakeholder forum, 2015 Hilton Addis Ababa). Apparently, these WASH sector services will be meaningful as far as sustainability planning and implementation mechanism is considered.

### **1.1. Background of the Study**

According to one WASH program operational manual, structural arrangement and functions for one WASH national implementation consists of different levels such as federal national WASH steering committee, regional WASH steering committee, Zonal WASH program management units, District WASH steering committee and town/city WASH steering committee. Each level has common responsibilities such as governance and guidance, oversight and management, program implementation and program coordination regarding different stages and capacities. It is mainly the role and responsibility of District and town/city WASH steering committee to follow up and regulate the operation and maintenance as well as sustainability of community managed rural water supply systems (one WASH national program operational manual final September 2014). An inclusion of water supply target related in growth and transformation program GTP (2016-2020), currently under development, would help increase the percentage of WASH

coverage in presence of sustainability plan and implementation mechanism with detail indicators to identifying factors affecting water supply sustainability. According to Action Contre la faim (ACF) France technical department WASH service November 2007 a range of studies have been under taken which high lights a range of factors which affect sustainability. As the definition of water supply, sustainability can incorporate ideas like the ability of water supply development project to maintain or expand a flow of benefits at a specified level for long period after project inputs have ceased. In the narrowest meaning, the project is the physical structure established and maintained/operated by the participating institutions “Weather or not something continues to overtime” and a drinking water supply is sustainable if: the water consumed is not over-exploited but naturally replenished. If facilities are maintained in a condition, which ensures a reliable and adequate potable supply and the benefits of the supply continues to be realized over a prolonged period.

Gurage is a zone in the Ethiopian southern nations, nationalities and peoples’ Region (SNNPR). Gurage is bordered on the southeast by Haddiya and Yem special District; on the west, north and east by Romia region and on the southeast by Silte zone. Its highest point is mount Gurage and Wolkite is the administrative center of the Zone. Cheha (Emdiber) is one of the Districts in Gurage Zone and has an elevation between 1.500 and 2.300 meters above sea level. Cheha district consists 34 Kebeles of which 4 is semi-urban and the rest 30 are rural Kebels. Cheha district is traditionally classified under the Woyna Dega agro-climate zone and it has a single principal rain season from early June to mid-September. Cheha District has a total population of 147,040 of whom 71918 are men and 75122 are female; 11764 or 8% of its population are urban dwellers. As Cheha District water and energy office secondary data, there are two major gravity water supply schemes with 57 water distribution points, 134 bore hole shallow wells and 37 on spot springs implemented mainly by government and non-government humanitarian organizations (Ethiopian Kalehywet church WASH programs and Catholic Church WASH programs). Now a day’s all water projects constructed by government and non-government organizations are handed over/ transferred to respective District water and energy office and studies have not been conducted with same topic ( factors affecting sustainability of water supply project) in the District.

## **1.2. Problem Statement**

Project sustainability is a major issue for many beneficiary communities and implementing agencies in low and middle-income countries. Unsustainable projects have less impact on the local community for the long term leave community need unmet are wasteful human, monetary and technical start-up investments and can diminish community trust and support for future projects (Shediach-Rizhallah and Bone, 1998). In order to achieve the intended impact on a community, projects must sustain once implemented.

Sustainability is defined as whether or not something continues in service over time (Abrams, 1998). However planning for sustainability is challenging and thus is rarely, incorporated in the planning process of initiatives (Sridharan, Zinzow, Gray and Barrett, 2007). Projects often focus on providing basic infrastructure rather than ongoing functionality. Some cases reported on many examples of “failed water supply “projects (Moe and Rheingans 2006). The sustainability of rural water supply is the function of two broad factors. These are project rules and external factors. The project rule factors related to communities demand responsiveness such as community participation and cost sharing during water supply system implementation in kind and in cash and other project rules including technology type sub project costs and training, (Getachew, 2005). Sustainability rate of rural water supply increase or decrease depending on community demand and owning and managing habit their water supply schemes and 33% of water supply project is non-functional after completion in Ethiopia (demography and health survey 2015). Unless the end users are given the opportunity to be involved in the development of water supply project designed to improve their livelihood, they will continue to miss the benefits of any projects. Community involvement is a social process whereby specific groups with needs, often but not always living in defined geographic areas, actively pursue identification of their needs, make decision and establish mechanism to meet these needs (Ofuoku, 2011, Sonwabo 2009).

Extent of village level management participation, beneficiary community cost recovery for operation and maintenance, funding sources, organization structure, availability of base line data, monitoring and evaluation system for projects, type number and relevance of community trainings are some of the independent variable in this study. Whereas, functionality and



reliability of water projects, community ownership of the project and continued improvement of the project are some of the dependent variable of the study.

Opportunity for community to choose the service level based on an ‘informed choice’ will influence community’s sense of ownership of the project and will ensure that the project will meet the community’s needs at this point in time. (WASH sustainability forum Amsterdam July 2014).

Implementation of water supply projects should not be an end in themselves, but as an initiators of benefits that continue long after the project have been handed over to the community (Brikke and Bredero, 2003). Sustainable water supply systems need to meet standard criteria in terms of design and construction; quantity and quality based on local needs and resources; and management of funds and technical support to solve system’s breakdowns efficiently (Sijibesma and Postma, 2008). Though different definitions of sustainability have been provided the one presented by Agyeman and Angus includes the concepts of equity and environmental protection “sustainability is the need to ensure a better quality of life for all, now and into the future, in a just and equitable manner, while living within the limits of supporting ecosystems (Agyeman, 2003). Access to safe water supply for population in Ethiopia is low translating to indicator the proportion of population using drinking water is only (57%). Hence, life expectancy at birth is 64.8 years. Thus, high under five mortality rates per 1000 live birth is 59.2 and high incidence of water wash and water born diseases are among these population as mortality rate attributed to exposure to unsafe WASH services per 100,000 population in 2012 is 29.6 (World health statistics 2015 and 2016). After physical completion of water supply project, appropriate care should follow consistently. The problem extends as failed/non-functional schemes beneficiary’s communities overload functional water supply by sharing water flow yield and these lead to queue/waiting at source for both non-functional water schemes beneficiaries and functional schemes beneficiaries. Excess beneficiary over one functional water supply scheme might create pump, pipe, rod and cylinder damage through time and functional water supply schemes gradually can became non-functional.

As Cheha District water and energy office secondary data and health office information, there are two major gravity water supply schemes with 57 water distribution points, 134 bore hole shallow wells and 37 on spot springs implemented mainly by government and non-government

humanitarian organizations (Ethiopian Kalehywet church WASH programs and Catholic Church WASH programs).

Currently, 11 (19%) of water distribution points, 35 (26%) of bore hole shallow wells and 9 (24%) of protected on spot springs failed and not giving needed services.

In general, empirical literatures reviewed in this study have considered population growth and the demand of the community, water supply system design and construction (technology choice), status of ground water table in relation with water shading as water supply project sustainability problem (sustainability affecting factors) WASH sustainability forum Amsterdam, July (2014); Sijibesma; Postma,( 2008), Sara et al (1997).

Whereas, This study focuses on community participation, project financing, project organization management practices and community training and awareness creation as water supply project sustainability problems Gatari Samuel, April(2016) in relation with time and place gaps.

### **1.3. Research Questions**

The following research questions were generated from problem statement and will be answered through this study

- 1- To what level community participation affects sustainability of water supply project in Cheha Woreda?
- 2- To what level project financing affect sustainability of water supply project in Cheha Woreda?
- 3- To what level project organization management affect sustainability of water supply project in Cheha Woreda?
- 4- To what level communities training affect sustainability of water supply project in Cheha Woreda?

#### **1.4. Hypotheses of the study**

The hypotheses of this study were:

H1o: Four selected factors (community participation, project financing, organization management and community training) either collectively or individually do not affect water supply project sustainability

H1A: Four selected factors (community participation, project financing, organization management and community training) either collectively or individually do affect water supply project sustainability.

#### **1.5. General Objective**

The general objective of this study was to evaluate and realize the level of factors affecting sustainability of water supply project and to provide assessment inputs through possible recommendation in Gurage zone Cheha Woreda.

#### **1.6. Specific Objectives**

- 1- To evaluate the level of community participation as a factor affecting sustainability of water supply project in Gurage zone, Cheha Woreda
- 2- To examine the level of project financing as a factor affecting sustainability of water supply project in the study area
- 3- To investigate the level of organization management as a factor affecting sustainability of water supply project in the study area
- 4- To evaluate the level of community training as a factor affecting sustainability of water supply project in the study area

#### **1.7. Scope of the Study**

This study was conducted in Cheha district Gurage zone on water supply projects implemented in the decades before last year (2016) and it did not include unhandover water supply projects. Conceptually the study was restricted to examine external factors like project financing and organization management practice and internal factors like community participation and community training as affecting sustainability of water supply projects.

### **1.8. Limitations of the Study**

This study was faced time shortage as only few months are allocated to come up with reasonably important research result and limitations in relation with up-to date theoretical literature resources. Further, this study was conducted in purposively selected five Kebeles representing total water supply schemes in the Woreda. Some literature include wide range of factors affecting sustainability of water supply, Moreover, the cross-sectional nature of the study is one of the limitation and due to financial and time constraint, I am restricted to only factors used by (Gatari Samuel, 2016).

### **1.9. Significance of the Study**

This study was investigated important information concerning factors affecting water supply project in Gurage zone Cheha district. The importance to district under study will positively remarked as it address major factors such as community participation, project financing, project organization management practice and community training. Further documenting the result of this study in district under study as well as country level will be positive asset to improve the practice of controlling factors affecting sustainability of water supply projects. Moreover, the research data obtained from this study has the potential to contribute in resolving the concerns created by a lack of research in the area of factors affecting sustainability of water supply projects in rural set up.

### **1.10. Organizations of the Study**

This study consists of five chapters. The first chapter focuses on introduction and background of the study introduces the context of the area understudy and rationale about the study as well as the contribution of the study in knowledge areas. Further, it incorporates statement of the problem, general and specific objective, research questions, hypothesis, significance, scope and limitation of the study. While chapter tow concerned with theoretical and conceptual literature reviews. Chapter three devoted to study design and methodology with its descriptions in detail. Whereas, chapter four introduces data analysis, interpretation, discussion and result and finally, chapter five focuses on findings conclusion and recommendation of the study.

## CHAPTER TWO

### REVIEW OF RELATED LITERATURE

Literature review provide a rationale for research study as it investigates theoretical and empirical review from various sources such as books, articles, journals and reports (Dr Manuel S Thomas 2010). Literature review relates a study to the larger ongoing dialogue, filling in gaps and extending the prior studies (Marshal and Rossman, 2011). Furthermore, literature review provides a framework for establishing the importance of the study as well as benchmark for comparing the results with other findings. All or some of these reasons may be the foundation for writing the scholarly literature in to the study (Boote and Beile, 2005).

#### **2.1. Theoretical or Conceptual Review**

#### **2.2. Factors Affecting Sustainability**

The widespread failures in water supply have been attributed to a number of flaws in the project. The low desire of intervention by the community (community participation), lack of ownership, neglecting in maintenance and repair, short and shallow education and training, trained members of the community move away or lose interest, in general terms; financial, social, technical environmental, and institutional factors are substantially affecting sustainability of water supply project (Carter et al, 1999).

#### **2.3. Sustainability**

The widely used definition of sustainability is that by Gro Harmel Burndtland world commission on March 20, 1987: “sustainability development is development that meets the need of present time without compromising the ability of future generations to meet their own needs”. It includes environmental, economic and social dimensions with concept of stewardship. The idea of sustainability and the interlinked issues of environmental and development have risen to the top of the international political agenda. The sustainability problem will only be solved by adopting the holistic approach to planning and implementation rather than focusing on one issue. The sustainability of water supply projects has been defined as the maintenance over time of the project benefit. Benefits from safe water supply can be numerous in relation with intended

purposes such as water born and water wash disease prevention and minimizing associated consequence that might lead to poverty cycle, hence, sustainability might be management responsibility in its meaning that consists maintenance and operation as well as access to prolonged service (Hodgkin et. al, 1994). Functionality of water supply system is about the number of water supply facilities that are operational at any given time and the significance of functionality is reflected in the reliability of those systems (IRC, 2015 Uganda). Indicators for sustainable rural water supplies are functionality, reliability, accessibility and adequacy, water-fetching time in round trip, operation and maintenance fund allocation, beneficiary ownership and existence of functional water management committee (Panthi and Bhattarai, 2008)

Water aid described key conceptual factors affecting rural water supply sustainability such as, demand and relevant need, program design and implementation, existence of water supply management committee, revenue collection and record and external support (water aid, 2011). The theoretical idea of sustainable development has emerged from 21<sup>st</sup> century “the sustainability century” but it was considered extremely expensive to be put in practice by many corporations, firms and local or national governments (Elkington, 1917).

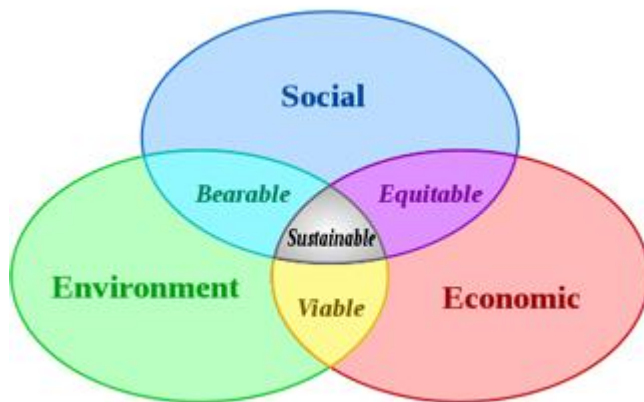


Fig-2.1 Three-Sustainability Pillars

Source; The 1987 Report of the Brundtland Commission

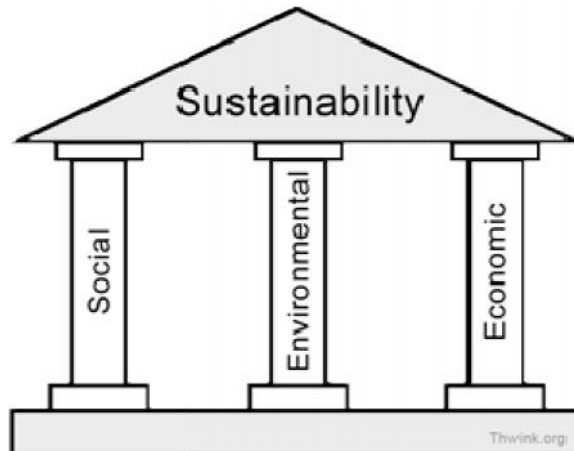


Figure-2:2 Three-Sustainability Pillars

(Source; The 1987 Report of the Brundtland Commission)

“The three pillars of sustainability are powerful tool for defining the complete sustainability problem. This consists of at least the economic social and environmental pillars”. Social sustainability is the ability of social system such as, country, family or organization to function at a defined level of social well being and harmony indefinitely. Whereas, environmental sustainability is about the ability of environment, to support a defined level of environmental quality and natural resources extraction rates indefinitely. Lastly, economic sustainability is the ability of an economy to support a defined level of economic production indefinitely (Bob Willard July 20, 2010).

#### **2.4. Community Participation**

Community participation theory states the ten key guides about effective participation, which can aid thinking about community involvement. Level of participation proposes a five-rung ladder of participation, which relates to the stance an organization promoting participation may take. This first level consists transferring information (merely telling), consultation (offering some options/listing some feedback, but not allow to new idea), deciding together (encouraging additional options and ideas), acting together (form a partnership to carry it out) and supporting independent community interests (offering local groups funds, advice or other support to develop their own agendas with in guidelines). Other steps includes initiation and process, control, power and purpose, role of the practitioner, stakeholders and community, partnership, commitment,

ownership of ideas and confidence and capacity building Shediak-Rizkallah, M. C., & Bone, L. R. (1998).

In relation with turning idea into practice, public meeting, a good leaflet, video and exhibition to get the message across, commissioning a survey, appoint liaison officer, work through a voluntary sector, set up a consultative committee and run a planning for real session (David Wilcox, 1994). Involvement or participation is the process through which stakeholders influence and share control over development initiatives the decision and resource which affect them (Kinyashi, 2008 and Ofuoku, 2011). Unless the end users are given the opportunity to be involved in the development of projects designed to improve their livelihood, they will continue to miss the benefits of any projects (Sonowabo 2009).

Involving the community in planning project will benefit an implementing agency, the intended participants, and the community as a whole stakeholder in contributing for sustainability. When community members admitted to help plan and implement project, they develop a sense of ownership. They want the participation to succeed and are more willing to invest the effort and resources needed to sustain it. Involving the community also makes it easier to obtain the resources and volunteers the implementing agency need to carry out its water supply project sustainability project execution (Paul, 1987). Community should have the capacity to organize themselves in relation to project in sustainable way (L.persoon, 2016). Experience with community-driven development (CDD), shows that communities already have substantial skills. Local capacity exists but needs empowerment to be harnessed. This is a major conclusion of a technical consultation organized in Rome in 1997 jointly by the World Bank, FAO, IFAD, and others.

## **2.5. Project Financing**

A huge body of literature is available today on the subject of structured finance in general and project finance in particular. The majority of authors agree on defining project finance as financing that, as a priority does not depend on the soundness and creditworthiness of the sponsors, namely, parties proposing the idea to launch the project. It is the function of a project's ability to repay the debt contracted and remunerate capital invested as a rate consistent with degree of risk inherent in the venture concerned (Stefano Gatti, 2008). Social fund agencies, based in government, which provide finance for small-scale projects normally infrastructure



schemes, proposed by local government or community organizations based on their need demand. Community involvement in providing resources and perception support make projects sustainable in terms of benefits versus cost (Abule, Samba-Ndure, K., 1995) & (Boland, Whittington, 2000).

These were initiated in Latin America in the mid-1980s in response to economic and post-conflict dislocation and World Bank has approved social fund since 1987 in Latin America and Africa. Many projects assisted by other donors have identical or similar characteristics to the WB social fund concept in that they establish funds, which canvass proposal for small-scale schemes from local government and/or community organizations. One of the social fund projects is drinking water supply, operation, and maintenance financing (A. Batkin, 2001 Asian development bank). Water tariff collection from beneficiary community in an organized and well-documented manner provide a chance to have pre-deposited liquid cash for water supply systems operation and maintenance activities, spare parts supply chain and cover Perdiuum cost of scheme maintenance technicians. Thus, financing process enhances rural water supply sustainability (Bauman, 2008).

## **2.6. Project Organization Management Practices.**

There are wide spread evidence to suggest that after a number of years of operation, or less in some cases, many rural water supply systems will face to variety of problems, these can include technical failures as well as management challenges. It is recognized that there is a limit to sustained community management that a majority of communities will require some form of external assistance in the longer term (Harold Lockwood, 2002). Continued and ongoing external support to community organization contribute both to an increase in the impact of interventions and to the length of time over which these impacts will sustained (Water Aid, 2000). Management of rural water supply can be successful at empowering community and improving their involvement, increasingly it is being adopted in countries national policy and legislation framework as the favored to operate and maintain rural water supply systems.

Community management is seen as answer to large scale broken down of water supply systems and the failure of governments to either provide potable water themselves, or devise a system where other agencies supply it reliability and consistently (Ton Schouten, Patrick Moriarty and

Leonie Postma, 2003). It is needed to look water supply system sustainability beyond community management, and outside agencies should not derive off in the sunset and every one lives happily ever after. Water supply management theoretically puts responsibility in hands of all stakeholders. Base line survey assessment of hydrogeology, geophysics, engineering, developmental planning and sociology help determine the appropriate type of water supply source and potential yield of water in specific depth availability can provide information for sustainability of rural water supply (Sebsibe Alemneh, 2002). Monitoring routines of rural community water supply system have shown a positive impact on the motivation to properly manage, operate and maintain their water supply system to achieve the objective of water supply sustainability (A.G.Koestler, M.A.Koestler, 2009).

## **2.7. Community Training**

Project fund and resource need to be allocated with community, government and agencies consultation. Post implementation support such as scheme caretakers training, community awareness creation, and periodical visit can have positive association with water supply project sustainability (Komives et al, 2008). In relation with relevance of training, learners need trainings that match their current need and demand as human brain prioritizes first on survival, emotional security, finally learning need. At the time of training, community and/or water supply management committee need to have three things, safe environment, effective communication and frequent practice (CAWST training manual, 2011). Effective communication can have vast definition as “identification and formulation of key issues to be communicated and identification of target audience, research on current knowledge, attitude, behavior, and practice of each target group around the required future change in behavior, development of message based on current knowledge and behavior. Furthermore, it includes pre-test messages, identification of appropriate communication channel, preparation of communication materials, pre-test of materials, training of communicators, development of indicators to assess the impact, implementation of communication and assessment of impact and adjustment of program design” (WHO, Geneva, Switzerland, 2000).

## **2.8. Summary of Literature Review**

Tremendous of literatures have been proposed and used based on time, place, and type of water supply system, extent of sustainability problem, concept and practice gaps etc. differences. Furthermore, several researches have documented various regional and theoretical experience and suggested different factors identified as affecting sustainability of safe water supply system. In summary, all literature reasonably has the same consensus. Thus, the findings of the study expected to contribute additional knowledge and practice dimensions in understanding of factors affecting sustainability of water supply projects among beneficiary community, district and zonal WASH steering committee, and regional and federal policy makers and the gaps in relation with time , place, and community training approaches expected to be filled (source researcher).

## **2.9. Conceptual Framework**

Community participation is self-initiative involvement of the beneficiary community in decision-making and takes part in authority sharing as well as contribution in kind or in cash to the success of water supply project planning and implementation. Whereas, project financing meant to generate, manage and appropriate use of find by beneficiary community, government and nongovernment agencies. In this study, the project organization management is about management practice of water supply schemes by beneficiary community, water supply schemes management committee scheme care takers, district WASH steering committee and Zonal WASH steering entities. Community training is about type, content and deliverance style of trainings for both beneficiary community and water supply management in a non-disturbed environment, by appropriate communication channel, and with practice sessions. These independent variables considered as have substantial effect on dependent variables such as, sustainability states about functionality and reliability of water supply projects, community ownership of the project and continued improvement of the project.

## Independent Variables

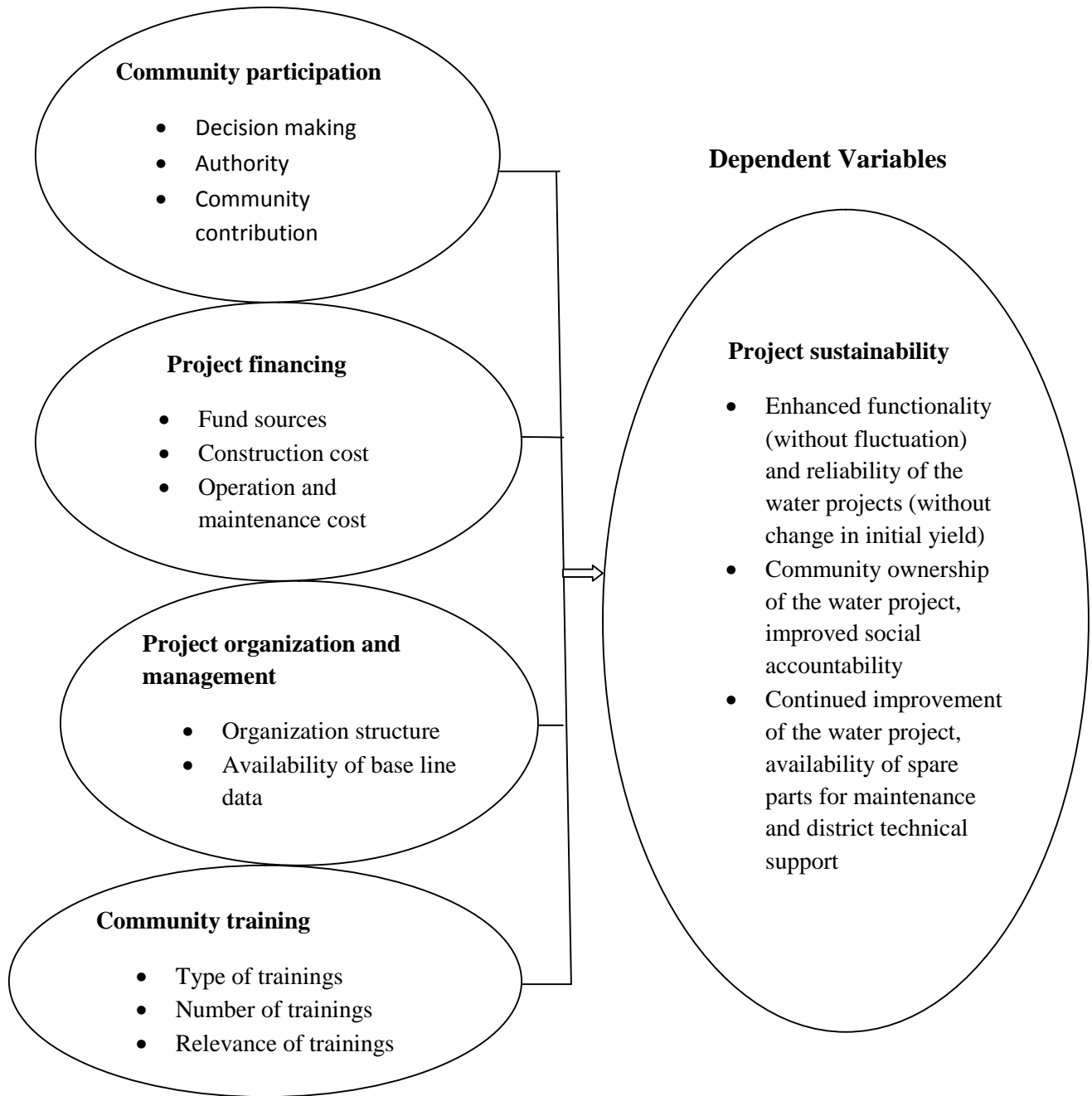


Figure-2:3 Conceptual Framework of the Study

Adopted; from Gatari Samuel, April 2016 p-133

## CHAPTER THREE

### RESEARCH DESIGN AND METHODOLOGY

#### **3.1. Introduction**

Descriptive research design was considered with both qualitative and quantitative approaches and cross sectional data was obtained and it consists six parts. Part one of this study enabled to collect demographic information which consists sex, age, education status, occupation and income of the respondents. While part two of this study comprises the level of community participation with reliable variables. Furthermore, this study comprises project financing, organizational management, community training and water supply project sustainability with their detail variables. The study design also considered the involvement of key informants with reliable discussion questionnaires. This descriptive approach expected to provide primary data and facts about respondent's habits, feelings, attitudes and opinions (Kombo and Tromp, 2007). This type of design can provide adequate room for description of activities, persons and objects it also predicts relationships among variables of the study. Further, the descriptive survey design help the researcher to make accurate assessment, relationship of phenomenon, event/issues and conclusion ( Kasomo 2006). Participants had responded their opinion using a five-point Likert scale categorized as 1= strongly disagree, 2= disagree, 3= undecided, 4= agree, 5= strongly agree. Finally, qualitative approach using structured interview questions that involved variables that affect sustainability of water supply project was employed.

#### **3.2. Target Population**

According to Cheha Woreda water and energy office secondary data, there were 228 total water supply schemes implemented before the end of 2016 and transferred to respective beneficiary community under Woreda WASH steering committee regulation. Thus, as each water supply scheme consist 50 households, the total 228 water supply schemes have been serving 11,400 households (approximately a total population of 57,000) till 55 water supply schemes which have been serving 16,500 populations became non-functional. Therefore, the researcher was considered research sample from both functional and non-functional schemes based on their schemes size from beneficiary community members and WASH.com members at community

managed water supply level in deriving sample water supply schemes to apply survey questionnaires and three Woreda water and energy office key informant who have been in the role of expertise for more than five years in Cheha Woreda.

### 3.3 Sample and Sampling Technique

Based on none-probability sampling technique and purposive sampling method consideration of time, cost and difficult road access, the household heads with substantial responsibility and knowledge for their water supply scheme were interviewed for primary source of data. Purposive sampling for Kebele selection is inclusive and works as criteria for choosing particular sampling unites, in this case, one member of management committee represents other members of elected WASH committee who have been involving in operation and maintenance activities. Whereas, nearly equal size of male and female in the community members in water supply scheme stand representing beneficiary community. Ethical consideration was undertaken as an ethical confidentiality issue is restricted with in frame of academic purpose considering unnecessary confidential data and informal information dissemination out of intended objective. Further, populations under study were informed clearly and all materials and references were duly acknowledged.

Based on purposive sampling due to time, cost, and difficult road access, 17 schemes from both functional and non-functional water supply schemes in 5 Kebeles were considered for further sampling using Slovin’s sample deriving formula as each schemes consists 50 households.

Thus,

$$(x)^n = \frac{x^2 (NP) (1-P)}{D^2 (N-1) + x^2 P (1-P)}$$

Where

$X^2$  = the table value of 95% confident interval

P = the population proportion assumed to be 0.5 for it provides

D = the degree of accuracy expressed as a proportion

N = the population size

S = required sample size

Hence,

$$X^2 = 1.96 \quad N = 850$$

$$D^2 = 0.05 \quad P = 0.5$$

$$\begin{aligned} &= \frac{(1.96)^2 (850) (0.5) (1-P)}{0.0025^2 (850-1) + 1.96^2 0.5 (1-0.5)} \\ &= \frac{3.8416 (424.5) (0.5)}{0.0025 (849) + 3.8416 (0.5) (0.5)} \\ &= \frac{815.3796}{3.0829} \end{aligned}$$

S = 265 household heads + 3 key informants from Woreda water and energy office.

Therefore, from 10 water supply schemes 160 household heads were surveyed and from 7 water supply schemes, 105 household heads were surveyed and in each surveying scheme, 1 water management committee was considered. Whereas, 3 key informants for qualitative data survey were from Woreda water and energy office.

### **3.4. Instruments of Data Collection**

Primary data was collected by applying structured survey questionnaires to beneficiary community and WASH committee representatives, while structured interview guide stands for key informant's interview and complete necessary information was obtained through face-to-face respondents contact. Survey questionnaire was translated in to Amharic and Woreda water and energy office employees and Ethiopian Kalehewot church WASH project employees help researcher in collection data after getting detail orientation.

### **3.5. Pilot Testing**

The researcher has submitted structured questionnaires to people as same capacity as those were assigned to collect data to test it before collecting data as it help identify questions that do not make sense to participants or problem with the questionnaire that might lead to biased answers and corrections were made accordingly.

### 3.6. Methods of Data Analysis

The data collected from beneficiary community and WASH.com using survey questionnaire were entered and analyzed mainly with the help of descriptive statistical analysis instruments mainly frequency and percent. Besides, Pearson bivariate correlations and linear regression were employed using analytic tool package SPSS. Prior to statistics analysis, data cleaning and handling of missing values was performed as appropriate. On the other hand, qualitative data collected from three Woreda water and energy office key informants were analyzed in rational qualitative method.

### 3.7. Reliability and Validity of Data Collection Tools

The reliability of an instrument is defined as the consistence of the instrument in picking the needed information. Whereas the validity of the instrument defined as the ability to an instrument measure what it is intended to measure. The reliability of the data collection tools that were employed for this study was tested by Laub (1999) using large sample data. According to Nunnally (1978) Cronbach's alpha of .60 is an acceptable level for reliability measure. According to Laub (1999), the Cronbach alpha coefficients for each of the five clusters of variables employed in this study are as follows:

Table-3.1: Reliability Test Result

Scale item	Cronbach's Alpha coefficient	N of items
Community participation	.78	3
Project financing	.88	6
Organization management	.84	5
Community training	.82	5
Sustainability	.80	7

Source, Own Survey, 2018

On the other hand, to ensure the validity of the data collection tools employed on the current study different actions were taken. The data was collected from primary and reliable source i.e. directly from water supply beneficiary community and Woreda water and energy office through face-to-face survey with full confidentiality.



## CHAPTER FOUR

### RESEARCH RESULT AND DISCUSSION

#### 4.1 Introduction

In this chapter the findings of the current study with its data analysis and interpretation parts are presented. The researcher has distributed 53 questionnaires with all variables under five clusters for each five water and energy office data collectors and the survey data was collected from water supply project beneficiary community with guidance and supervision of researcher with in four days. While, qualitative data was collected from Woreda water and energy office expertise by researcher on fifth day. The entire designed sample size was achieved with 100 % response rate and considered as enough to allow for generalization of findings to target population. All respondents were inhabitants for more than three years in the study area.

##### **4.1.1. Demographic and Socio-Economic Characteristics of the Respondents**

###### **4.1.1.1. Sex and Age Distribution of the Respondents**

The demographic information of the respondents is presented below in figure-3 and 4. In figure-3 the researcher sought to determine sex and age characteristics of the respondents. Hence, (57%) were male and (43%) were female. However, this frequency did not exactly fit the proposed proportion of sex distribution of respondents; the report indicated that nearly equal size of male and female have participated in structured survey and the information obtained were considered gender role in water supply project sustainability in Gurage zone Cheha Woreda. With regard of age distribution table-4, majority (98.9%) of the respondents were in the age range of 20-55 and in productive age group. Thus, respondents involved in research survey were appropriate as they were active enough to take part in decision making on their water supply project sustainability.

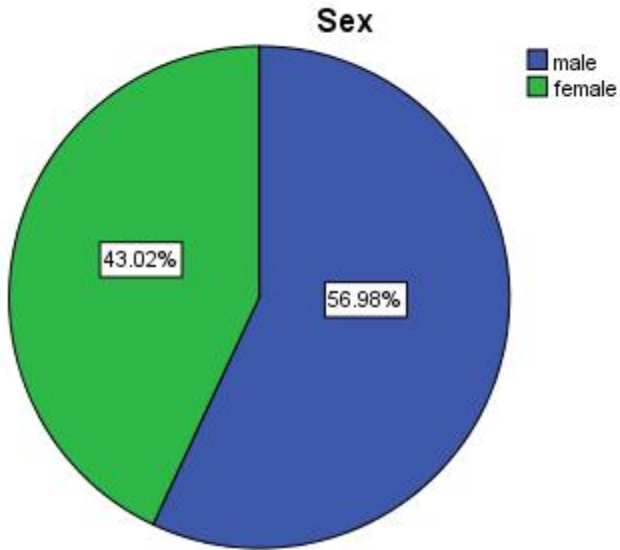


Fig-4.1: Sex Distribution of the Respondents

Source, Own Survey, 2018

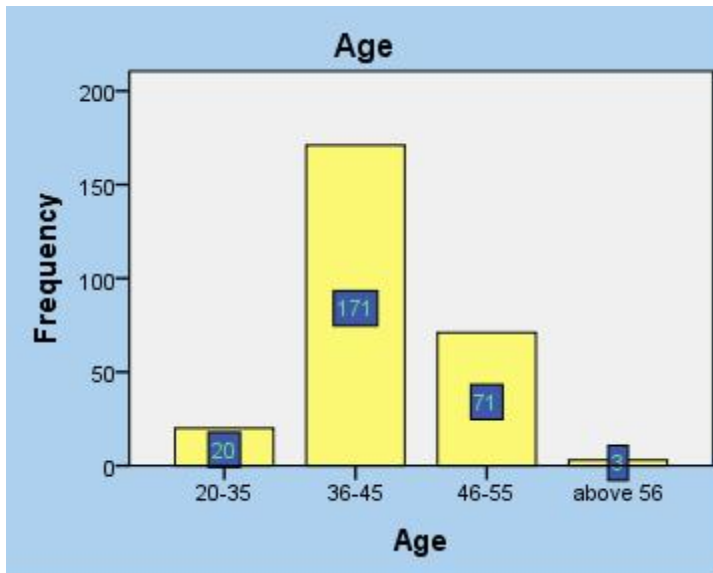


Fig-4.2: Age Distribution of the Respondents

Source, Own Survey, 2018

#### **4.1.1.2. Education Status, Occupation and Income Distribution of the Respondent**

The researcher had also considered other major areas of respondent's background in relation with socio-economic status such as education level, occupation and income. With regard to education level, the study finding in table-4.1 shown respondents under different educational categories while illiterate, read and write and those under primary grade 1-6 all together (59.6%) mainly live in rural Kebeles such as Yeferejiya, Yedebura and Grar-Deber. Thus, (51.3%) respondents under these educations level were farmer. Similarly, (8.7%) of respondents were categorized from Junior (7-8) to Preparatory (11-12) and do practice either farming or trading or both in combination. Hence, including these groups (19.6%) respondents live in above mentioned rural Kebeles as well as semi-urban Kebeles (Emdibir 01 and 02). Furthermore, in terms of education level (31.7%) of respondents were categorized above grade 12 and the group were mainly government employees who live in District capital Emdibir town.

With regard to annual income, relatively equal size (53.6%) of respondents were sought as they earn less than or equal 12,000 per year. However, (46.4%) respondents were earn more than or equal to 12,001. Therefore, as demographic and socio-economic background the researcher had considered different dimensions: for instance, education status from illiterate to above 12, occupationally, from framing to government employee and annual income from low to high income earning group in different size. Thus, heterogeneity of respondents provides good room to come up with different opinions that help produce valuable inferences.

Table-4.1: Education Status, Occupation and Income Distribution of the Respondents

In general, households within this Woreda....		Frequency	Percent	Cumulative Percent
Education status	Illiterate	60	22.6	22.6
	Read and write	59	22.3	44.9
	Grade 1-6	39	14.7	59.6
	Junior (7-8)	13	4.9	64.5
	High school (9-10)	8	3.0	67.5
	Preparatory (11-12)	2	.8	68.3
	Above 12 Grade	84	31.7	100.0
	<b>Total</b>	<b>265</b>	<b>100.0</b>	
Occupation	Farming	136	51.3	51.3
	Trading	44	16.6	67.9
	Farming and Trading	8	3.0	70.9
	Government employee	77	29.1	100.0
	<b>Total</b>	<b>265</b>	<b>100.0</b>	
Income	3000-6000	8	3.0	3.0
	6001-9000	47	17.7	20.8
	9001-12000	87	32.8	53.6
	Above 12,001	123	46.4	100.0
	<b>Total</b>	<b>265</b>	<b>100.0</b>	

Source, Own Survey, 2018

#### **4.2. Community Participation as a Factors Affecting Sustainability of Water Supply Project**

Community participation for water supply project in Cheha Woreda was evaluated using structured interview questions. Hence, 154 (58.1%) out of 265 respondents believe either (strongly disagree or disagree) that community participation in water supply project conception, design and implementation is practiced well in Cheha Woreda. On the other hand, 111 (41.9%) revealed (agree) that beneficiary community had participated in water supply project conception, design and implementation phases. Similarly, community participation evaluation with regard to women and disabled people participation in their water supply project management sought as

184 (69.4%) respondents believe (either strongly disagree or disagree) that there was participation of women and disabled people in management of their water supply project. On the other hand, 81 (30.6%) respondents had revealed (agree) as women and disabled people have participated in their water supply project management. In further evaluation of community participation, 171 (64.5%) of respondents believe either (strongly disagree or disagree) that the community structure is in place among water supply project beneficiaries. However, the remaining 94 (35.5%) respondents believe (agree) that there is community structure in place among water supply project beneficiary members. The frequency results of community participation are presented below in table-4.2.

Thus, the finding implies that, water supply projects in Gurage zone Cheha district were implemented with very little participation of beneficiary community this may be because of insufficient community mobilization in terms of conception as their basic need should be fulfilled by their positive problem identification, consent and initiation, design where to implement and how many schemes to implement, clear portion of project should be covered by beneficiary community members were not properly proposed from both government and donors as project implementers. This finding has agreement with statement sustainability can also be affected by project layout, design and how it was implemented (Shediac-Rizkallah et al., 1998).

Moreover, the project implementers did not fully consider potential with disabled people to manage water supply project and positive role to participate women as they were front line responsible group of community to collect water and culturally more accountable to make available drinking water at household level. Another study also confirms in 1985 and 1987 women and children made 88% of water-carrying trips (Mengesha Admassu MD, 2002). Similarly, the finding implies that there was no well organized community structure in place to manage water supply schemes this may be because of initial ignorance to establish community level management team and to identify number of household to use and manage their water supply scheme responsibly. Community should have the capacity to organize themselves in relation to project in sustainable way (L. person, 2016). Experience with community-driven development (CDD), shows that communities already have substantial skills. Local capacity exists but needs empowerment to be harnessed. This is a major conclusion of a technical consultation organized in Rome in 1997 jointly by the World Bank, FAO, IFAD, and others.

Table-4.2: Frequency Distribution of Community Participation as a Factor Affecting Sustainability

In general, households within this Woreda...		Frequency	Percent	Cumulative Percent
Community have participated in conception, design and implementation	Strongly disagree	45	17.0	17.0
	Disagree	109	41.1	58.1
	Agree	111	41.9	100.0
	Total	265	100.0	
Women and disabled people have participated in management	Strongly disagree	69	26.0	26.0
	Disagree	115	43.4	69.4
	Agree	81	30.6	100.0
	Total	265	100.0	
Community structure was in place	Strongly disagree	76	28.7	28.7
	Disagree	95	35.8	64.5
	Agree	94	35.5	100.0
	Total	265	100.0	

Source, Own Survey, 2018

### 4.3. Project Financing as a Factor Affecting Sustainability

Project financing for water supply project in Cheha Woreda was examined using structured questionnaire. Thus, 188 (76.9%) out of 265 respondents believe either (strongly disagree or disagree) that beneficiary community were aware of the total cost of water supply project. On the other hand, 77 (27.1%) of respondents were found to believe (agree) that the community members did have awareness about their water supply project cost. However, project financing in terms of financial contribution for implementation and maintenance examined as 173 (65.3%) respondents believe that beneficiary community had made financial contributions for implementation and maintenance of water supply project while 92 (34.7%) of respondents had not made financial contribution. The project financing analysis also shown that 168 (63.4%) of respondents had opinion either (strongly agree or agree) that community was capable of meeting operation and maintenance cost of the water supply. However, the remaining 97 (36.6%) respondents did not believe (disagree) that beneficiary community was capable of meeting operation and maintenance cost. Project financing concerning source of fund examined as

majority 246 (92.8%) and 252 (95.1%) respondents had found to believe that water supply project was implemented by government and non-governmental organization (donors) respectively. However, project financing analysis examined that majority 249 (94%) respondents had revealed source of fund was not community. The frequency results of project financing are presented in table-4.3 below.

Based on frequency analysis the finding indicates that beneficiary community members had made financial contribution towards the implementation and maintenance of water supply project and the finding also shown they are capable of meeting operation and maintenance cost. One of the social fund projects is drinking water supply, operation, and maintenance financing (A. Batkin, 2001 Asian development bank). Community involvement in providing resources and perception support make projects sustainable in terms of benefits versus cost (Abule and Samba-Ndure, 1995).

The findings of this study has similarity as it is service it needs involvement of manpower, repairs, spare parts energy and other inputs with cost. Therefore, cost recovery system should be introduced (Boland and Whittington, 2000). On the other hand, beneficiary community were not properly informed of total water supply project cost funded by government and donors as well as contributed by beneficiary members that may be because of the funders had not kept informed them of every detail of water supply project. Proper dissemination of information about total project cost and other capital under community project can give beneficiary members insight about its magnitude in relation with sustainability challenges would not be managed by themselves after it happened. The bottom up approach matches the wider recognition of the need for active community participation keeping informed in development projects capable of sustainable management (Fraster, Dougill, Mabee, Reed and McAlpine, 2006)

Table-4.3: Frequency Distribution of Respondents for Project Financing

In general, households within this Woreda...		Frequency	Percent	Cumulative Percent
Community had awareness about project total cost	Strongly disagree	62	23.4	23.4
	Disagree	126	47.5	70.9
	Agree	77	29.1	100.0
	Total	265	100.0	
Community had made financial contribution for implementation and maintenance	Disagree	92	34.7	34.7
	Agree	110	41.5	76.2
	Strongly Agree	63	23.8	100.0
	Total	265	100.0	
Community had capacity to meet operation and maintenance cost	Disagree	97	36.6	36.6
	Agree	92	34.7	71.3
	Strongly Agree	76	28.7	100.0
	Total	265	100.0	
Source of fund was government	Disagree	19	7.2	7.2
	Agree	246	92.8	100.0
	Total	265	100.0	
Source of fund was community	Disagree	249	94.0	94.0
	Agree	16	6.0	100.0
	Total	265	100.0	
Source of fund was donor	Disagree	13	4.9	4.9
	Agree	252	95.1	100.0
	Total	265	100.0	

Source, Own Survey, 2018

#### 4.4. Organization Management Practices as a Factor Affecting Sustainability

Table-5 below investigated that majority 173 (65.3%) of respondents found to believe either (strong disagreement or disagreement) with statement that the goals and objectives of the water supply project were clear, However, (38.9%) of respondents had revealed positive perception (agreement). Similarly, 181 (68.3%) of respondents had shown either (strong disagreement or disagreement) with statement that responsibility and line of authority of project management team from both government and donors side were properly defined, However, only 84 (31.7%) of respondents had revealed positive perception (agreement). The finding in table-4.4 also investigated that 159 (60%) of respondents had either (strong disagreement or disagreement)



with statement standard project management tools and techniques such as work plans, monitoring and evaluation plans were used for managing water supply project. However, 106 (40%) of respondents had revealed agreement as standard tools and techniques were used.

Project organization and management practices analysis also investigated that, 158 (59.6%) of respondents had revealed either (strong disagreement or disagreement) that the statement progress of water supply project implementation and project team work was frequently reported in project meetings. This indicates that there was not adequate information flow in different stages of water supply project implementation forth and back among project team while 107 (40.4%) of study respondents had positive opinion (agreement) for the statement. Similarly, 173 (65.3%) of respondents had shown either (strong disagreement or disagreement) on the statement that there was adequate, quality and timely communication within the project team while (34.7%) of respondents had revealed positive opinion (agreement) for the statement.

Thus, water supply project beneficiaries did not have clear information about objective and goal statement as primary project users. Similarly, responsibility and line of authority had not been set clearly to avoid ambiguity among project users and their scheme management team may be it was not established from the beginning of project initiation or deteriorated in the min time after project completion. Community management is seen as answer to large scale broken down of water supply systems (Ton Schouten, Patrick Moriarty and Leonie Postma, 2003)

Project management tools and techniques, work plans monitoring and evaluation activities were not properly conducted. Monitoring routines of rural community water supply system have shown a positive impact on the motivation to properly manage, operate and maintain their water supply system to achieve the objective of water supply sustainability (A.G.Koestler, M.A.Koestler, 2009).

Furthermore, there were not enough dissemination of project implementation progress report among project team which could create essential information gap and clearly led to shortage of adequate, quality and timely communication within project team as clearly identified in frequency analysis of organization and management practices. Sustainability of water supply projects could originate from project environment, lack of sufficient resources and management related issues (Gebrehiwot, 2006). Performance reporting involves collecting and disseminating

of performance information to provide stakeholders/community with information about how resources are being used to achieve project objectives (PMBOKA, 2000 edition). In general, this finding indicated that project management team did not play significant role as generalist and facilitator as well as high level of technical competence team in the science of the project implementation and it has similarity with observation that it is recognized that there is a limit to sustained project without community management that a majority of communities will require some form of external assistance in the longer term (Harold Lockwood, 2002).

Table-4.4: Distribution of Frequency Analysis for Project Organization Management Practices

In general, households within this Woreda...		Frequency	Percent	Cumulative Percent
Objectives and goals were clear	Strongly disagree	69	26.0	26.0
	Disagree	104	39.2	65.3
	Agree	92	34.7	100.0
	Total	265	100.0	
Responsibility and line of authority was identified	Strongly disagree	40	15.1	15.1
	Disagree	141	53.2	68.3
	Agree	84	31.7	100.0
	Total	265	100.0	
Management tools and techniques: work plans, monitoring and evaluation were used	Strongly disagree	58	21.9	21.9
	Disagree	101	38.1	60.0
	Agree	106	40.0	100.0
	Total	265	100.0	
Implementation progress and project team work report was conducted	Strongly disagree	60	22.6	22.6
	Disagree	98	37.0	59.6
	Agree	107	40.4	100.0
	Total	265	100.0	
Adequate, quality and timely communication within project team was practiced	Strongly disagree	85	32.1	32.1
	Disagree	88	33.2	65.3
	Agree	92	34.7	100.0
	Total	265	100.0	

Source, Own Survey, 2018

#### **4.5. Community Trainings as Factor Affecting Sustainability**

According to community training evaluation in table-4.5 below, 167 (63%) of respondents had revealed either (strong disagreement or disagreement) that training conducted on community contribution in cash and in kind for water supply project beneficiary members, However, 98 (37%) of respondents had revealed that they got training on necessity of contribution in cash and kind for their water supply project implementation. Similarly, table-6 below noted that 179 (67.5%) of respondents had revealed either (strong disagreement or disagreement) that they did get training on how much and why they pay water tariff, However, 86 (32.5%) respondents had revealed that they did get training on the same issue.

In further analysis, 159 (60) of respondents had revealed either (strong disagreement or disagreement) that they did get training on how to protect and how to use after project completion, while 106 (40%) of respondents had revealed that they got training in relation with protecting and way of using their water supply project. Table 10 also evaluated that, 171 (64.5%) of respondents had revealed either (strong disagreement or disagreement) that village level management did take scheme management committee training for their water supply project, while 94 (35.5%) of respondents had revealed that village level management did have scheme management training. The finding in table also evaluated that, 180 (67.9%) of respondents had revealed (either strong disagreement or disagreement) that the community training over all water supplies project management was considered safe environment, effective communication and frequent practice. However, 85 (32.1%) of respondents had shown that the training for community considered safe environment effective communication and frequent practice.

Thus, the community training as factor affecting water supply project finding inference shown that, most of the community members had not get trained except for statement why and how much they pay water tariff. Therefore, lack of community awareness about their crucial project can be seen as one of the important factor which could lead to poor project management in general and non-sustainability of water supply project in particular. Training community on contribution in cash and in kind has pivotal role in supporting project implementation as well as enhancing sustainability giving due attention for their input in the project. Post implementation support such as scheme caretakers training, community awareness creation, and periodical visit can have positive association with water supply project sustainability (Komives et al, 2008)

Similarly training community on how to protect and how to use after water supply project completion can have positive impact as proper protection and good way of using project could directly related with water supply project sustainability. Training scheme management committee as beneficiary and as management members can play crucial role in community structuring and mobilizing for their water supply project implementation as well as sustainability measurements.

Another very necessary but most ignored part in relation with community training was work shop set up including safe training environment fulfilling necessary requirements such as toilet for male and female separately, water and other refreshments, machining training environment free of any disturbance in sense of managing trainees attention, effective communication such as auditory, visual and kinesthetic methods and trainees participatory method and provision of practice session in between topic delivery this discussion has similarity with (CAWST trainer manual for effective facilitation skill for trainers, 2011) .

Community training on sustainability of water supply project will increase local participation in developing and demanding that may satisfy the need of the community (Toole, 2002). Furthermore, it need to include pre-test messages, identification of appropriate communication channel, preparation of communication materials, pre-test of materials, training of communicators, development of indicators to assess the impact, implementation of communication and assessment of impact and adjustment of program design” (WHO, Geneva, Switzerland, 2000).

Table-4.5: Distribution of Frequency Analysis for Community Training

In general, households within this Woreda...		Frequency	Percent	Cumulative Percent
Training on contribution in cash and in kind was applied	Strongly disagree	73	27.5	27.5
	Disagree	94	35.5	63.0
	Agree	98	37.0	100.0
	Total	265	100.0	
Training on how much and why they pay water tariff was applied	Strongly disagree	51	19.2	19.2
	Disagree	128	48.3	67.5
	Agree	86	32.5	100.0
	Total	265	100.0	
Training on how to protect and how to use after project completion was applied	Strongly disagree	62	23.4	23.4
	Disagree	97	36.6	60.0
	Agree	106	40.0	100.0
	Total	265	100.0	
Scheme management committee have got training	Strongly disagree	61	23.0	23.0
	Disagree	110	41.5	64.5
	Agree	94	35.5	100.0
	Total	265	100.0	
Training for community was, considering safe environment, effective communication and frequent practice	Strongly disagree	85	32.1	32.1
	Disagree	95	35.8	67.9
	Agree	85	32.1	100.0
	Total	265	100.0	

Source, Own Survey, 2018

#### 4.6. Water Supply Project Sustainability in Cheha Woreda

The frequency finding in table-4.6 indicates that majority 160 (60.4%) of respondents had revealed that their water supply schemes have been serving community with fluctuation while 105 (39.6%) of respondents had agreed that their water supply scheme have been giving service without fluctuation. Similarly, 173 (65.3%) respondents had revealed disagreement for the statement community water supply scheme reliably (without change in initial yield). However,

(34.7%) respondents had indicated that their water supply scheme have been giving service with change in its initial yield. The finding also indicates that relatively large size 160 (60.4) respondents had revealed that community water supply scheme have been serving with change in waiting time (queue) while only 1 (.4%) respondent has undecided opinion. However, 104 (39.2%) respondents had revealed that their water supply scheme have been giving service without change in waiting time (queue). Large size 158 (58.9%) respondents had revealed that there was no community member's equal responsibility about water supply scheme while only 1 (.4%) respondent had reflected undecided opinion. However, (40.8%) respondents had revealed that their community has been sharing equal responsibility for water supply scheme management.

Large size 162 (61.1%) respondents had revealed that the community did not have practice about equal ownership on water supply scheme while 1 (.4%) respondent had reflected undecided opinion. However, 102 (38.5%) respondents had revealed community did have practice about equal ownership for their water supply scheme. Substantial size 204 (77%) respondents had revealed either (strong disagreement or agreement) that there was spare parts availability in community water supply management store while 61 (23%) respondents had revealed (agreement) that there were spare parts in community store. On the other hand, large size 189 (71.3%) respondents had revealed (agreement) that district operation and maintenance team have been providing technical support for community operation and maintenance team while 1 (.4%) respondent had shown undecided opinion. However, 75 (28.3%) respondents had revealed that there was no district operation and maintenance team technical support for community operation and maintenance team. Water supply project sustainability depends on different variables while the selected variables based on time and cost limitations have been defined (Carter et al, 1999). Indicators for sustainable rural water supplies which are functionality, reliability, accessibility and adequacy, water-fetching time in round trip, operation and maintenance fund allocation, beneficiary ownership and existence of functional water management committee (Panthi and Bhattarai, 2008).

All mentioned water supply project sustainability dependent variables except district technical team support for community technical team had reflected effect imposed by independent variables. Sustainability might be management responsibility in its meaning that consist maintenance and operation as well as access to prolonged service (Hodgkin et. al, 1994). The

“Sustainability development is development that meets the need of present time without compromising the ability of future generations to meet their own needs” (Gro Harmel Burndtland world commission, on March 20, 1987).

Table-4.6: Frequency Distribution of Water Supply Project Sustainability in Cheha Woreda

In general, households within this Woreda...		Frequency	Percent	Cumulative Percent
Water scheme have been serving without fluctuation	Disagree	160	60.4	60.4
	Agree	105	39.6	100.0
	Total	265	100.0	
Water scheme have been serving reliably (without change in initial yield)	Strongly disagree	1	.4	.4
	Disagree	172	64.9	65.3
	Agree	92	34.7	100.0
	Total	265	100.0	
Water scheme have been serving without change in waiting time (queue)	Disagree	160	60.4	60.4
	undecided	1	.4	60.8
	Agree	104	39.2	100.0
	Total	265	100.0	
Beneficiary members did have equal responsibility on water scheme	Disagree	156	58.9	58.9
	undecided	1	.4	59.2
	Agree	108	40.8	100.0
	Total	265	100.0	
Beneficiary community did have practice of equal ownership on water scheme	Strongly disagree	1	.4	.4
	Disagree	162	61.1	61.5
	Agree	102	38.5	100.0
	Total	265	100.0	
Spare parts were available in the community store	Strongly disagree	2	.8	.8
	Disagree	202	76.2	77.0
	Agree	61	23.0	100.0
	Total	265	100.0	
District team were providing technical support for community team	Disagree	75	28.3	28.3
	undecided	1	.4	28.7
	Agree	189	71.3	100.0
	Total	265	100.0	

Source, Own Survey, 2018

#### 4.7. Correlation Analysis of Independent and Dependent variables

To indicate the strength of relationship between variables, the researcher used Karl Pearson’s coefficient of correlation which used to measure the strength of linear association between two

variables and is represented by r. The Pearson correlation coefficient, r, can consider the range from +1 to -1. A value of 0 can stand for no association between the variables. A value greater than 0 indicate positive association and a value less than 0 indicates inverse association that is as the value of one variable increases the value of other variable decrease.

Table-4.7: Correlation of Dependent Variable against Independent Variables

		Water supply project sustainability	Community participation	Project financing	Organization management	Community training
Water supply project sustainability	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	265				
Community participation	Pearson Correlation	.042	1			
	Sig. (2-tailed)	.496				
	N	265	265			
Project financing	Pearson Correlation	.035	.012	1		
	Sig. (2-tailed)	.572	.844			
	N	265	265	265		
Organization management	Pearson Correlation	.273**	.174**	-.026	1	
	Sig. (2-tailed)	.000	.004	.673		
	N	265	265	265	265	
Community training	Pearson Correlation	.358**	.073	.062	.330**	1
	Sig. (2-tailed)	.000	.238	.315	.000	
	N	265	265	265	265	265

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Own Source, 2018



According to table-4.7 there was positive relationship between dependent variable sustainability of water supply project and independent variables such as, community participation, project financing, project organization management practices and community training (.042, .035, .273\*\* and .358\*\*) respectively. The positive relation indicates that there is correlation between factors affecting sustainability and sustainability of Cheha Woreda water supply project. Thus, project organization management practices and community training as factors affecting sustainability of water supply project in Cheha Worega were significant at (P<0.01) confidence level and their significance value were p = 0.00 and p = 0.00 respectively. While community participation and project financing had positive but not a significant p-values were p=.496 and .572 respectively. This implies that project organization management practices and community training were the most significant factors affecting water supply project sustainability in Cheha Woreda.

#### 4.8. Regression Analysis

In this study, regression analysis was used for its ability to test nature (how much) independent variables affect dependent variable.

The regression model researcher used was:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \mu$$

Y = Dependent variable – sustainability of water supply project

$\alpha$  = Constant

$\mu$  = Error

$\beta$  = Coefficient of disbursement

$X_1$  = Community participation

$X_2$  = Project financing

$X_3$  = Project organization management practice

$X_4$  = Beneficiary community training

Regression analysis was employed to determine the association between factors affecting sustainability of water supply project and sustainability of water supply project.

Table-4.8: Model Summary of Regression Analysis

<b>Model Summary</b>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.394 <sup>a</sup>	.155	.142	.41878
a. Predictors: (Constant), community training, project financing, community participation, organization management				

Source, Own Survey, 2018

The model summary in table-4.8 indicated that the coefficient of determination R square is .155 and R is .542 at 0.05 significant levels. The coefficient of determination shown that, 15.5% of the variation in the factors is explained by the independent variables (community participation, project financing, project organization management practices, and community training).

As indicated in table-4.8, the adjusted R square value was 0.142 which indicates low degree of goodness of fit meaning that about 14.2% of the variance on the dependent variable i.e. project sustainability can be explained.

Table-4.9: ANOVA Analysis

<b>ANOVA<sup>a</sup></b>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.388	4	2.097	11.957	.000 <sup>b</sup>
	Residual	45.599	260	.175		
	Total	53.987	264			
a. Dependent Variable: project sustainability						
b. Predictors: (Constant), community training, project financing, community participation, organization management						

Source, Own Survey, 2018

The result of analysis of variance ANOVA is presented in table-4.9 above. The ANOVA results for regression coefficient indicated that the significance of F is 0.00 which is less than 0.05. This indicates that there is a positive significant relationship between the factors affecting sustainability of water supply project and sustainability of water supply project. Hence the model is the good for data. On the other hand, the ANOVA table, shows the F-test value=11.957, sig=0.001. This implies that significant relationship existed between the dependent variable

(project sustainability) and the four independent variables namely community participation, community training, project financing and organization & management.

Table-4.10: Coefficient Result of the Average Variables Showing the Relationship between Combined Factors and Sustainability of Water Supply Project

<b>Coefficients<sup>a</sup></b>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.943	.264		7.352	.000
	Community participation	-.007	.035	-.011	-.186	.853
	Project financing	.025	.069	.021	.368	.713
	Organization management	.134	.046	.176	2.882	.004
	Community training	.219	.044	.299	4.937	.000

a. Dependent Variable: project sustainability

Source, Own Survey, 2018

From the data in table-4.10, the established regression equation was:

$$Y = 1.943 + -.007 X_1 + .025 X_2 + .134 X_3 + .219 X_4$$

The regression equation had revealed that project financing, project organization management practices and community training to a constant zero, sustainability of water supply project would be at 1.943. A unite decrease in community participation would lead to decrease in sustainability of water supply project by a factor of -.007, a unite increase in project financing would lead to increase in sustainability of water supply project by a factor of 0.25, a unite increase in project organization management practices would lead to increase in sustainability of water supply project by a factor of .134 and a unite increase in beneficiary community training would lead to increase in sustainability of water supply project by a factor of .219.

As shown on the regression coefficient table–12, community training and organization management had t-test result= 4.94, sig= 0.001 and t-test result= 2.88, sig= 0.004 respectively. This indicates that both community training and organization management were statistically significant at P<0.05 level. Thus, the null hypothesis estimated for these two independent

variables rejected. It is possible to conclude that the two independent variables had an effect on project sustainability.

#### **4.8 Qualitative Analysis of Information from Woreda Key Informants**

The researcher had included an opinion of three District water and energy office management members on some basic factors that can affect water supply project sustainability. Under this analysis the study sought to indentify weather community or implementers are project initiators, hence key informants revealed that most of the time government implementers initiate projects to make fair distribution in all Kebeles. In the way of rating community participation in decision making related to water supply planning implementation key informants explained that large size of communities are volunteer to participate while some are reluctant, in relation with type of trainings was given to water committee members and beneficiary community from NGOs and Government key informants revealed that training package contains water scheme management, sanitation and hygiene components, in terms of community water supply management committee reporting system to their District steering committee key informants indicated that water scheme management committee are active in reporting project functionality status on cell phones and through oral communication, in relation with responsibility to monitor and maintain water supply schemes in the community and how often however there is no standardized formats Woreda water and energy office technical team together with scheme management team conduct periodical visiting based on report from scheme care takers.

Concerning the role of Kebele administration, health extension workers and development agents in community water supply projects, key informants explained that they have little role just providing overview activities. On the other hand Woreda water supply and energy office plans over non-functional water supply schemes in the community focuses on fund raising and conducting maintenance and key informants explained that sources of fund for water supply project construction, operation and maintenance are government, donors and sometimes community.

However, the qualitative information from Woreda water and energy office sought some factors affecting water supply project sustainability differently than beneficiary community level survey

it is apparent that the extent of community participation did not include some portion of project beneficiaries. Moreover, the content of training and facilitation capacity of trainers had not been well evaluated whether they fit the skill and knowledge need gap of scheme water supply management committee and beneficiary community members.

Furthermore, maintenance and operation feedback response was not supported by active monitoring and evaluation using standardized formats and this situation may lead to further break down of water supply schemes. Finally, waiting for fund from donor and government take time and give chance for further breakdown of schemes with minor defects and create service overloading on functional schemes that lead to worn-out parts of the pump, pipe, cylinder, rod, valves and other parts of the scheme.

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.1. Summary

The level of factors affecting sustainability of water supply project in Gurage zone Chaha Woreda evaluated using structured survey questionnaires. Accordingly, 154 (58.1%) out of 265 respondents believe either (strongly disagree or disagree) that community participation in water supply project conception, design and implementation is practiced. On the other hand, 111 (41.9%) revealed (agree) that beneficiary community had participated in water supply project conception, design and implementation phases. Similarly, community participation evaluation with regard to women and disabled people participation in their water supply project management sought as 184 (69.4%) respondents believe (either strongly disagree or disagree) that there was participation of women and disabled people in management of their water supply project. On the other hand, 81 (30.6%) respondents had revealed (agree) as women and disabled people have participated in their water supply project management. In further evaluation of community participation, 171 (64.5%) of respondents believe either (strongly disagree or disagree) that the community structure is in place among water supply project beneficiaries. However, the remaining 94 (35.5%) respondents believe (agree) that there is community structure in place among water supply project beneficiary members.

Project financing for water supply project in Cheha Woreda was examined using structured questionnaire. Thus, 188 (76.9%) out of 265 respondents believe either (strongly disagree or disagree) that beneficiary community were aware of the total cost of water supply project. On the other hand, 77 (27.1%) of respondents were found to believe (agree) that the community members did have awareness about their water supply project cost. However, project financing in terms of financial contribution for implementation and maintenance examined as 173 (65.3%) respondents believe that beneficiary community had made financial contributions for implementation and maintenance of water supply project while 92 (34.7%) of respondents had not made financial contribution. The project financing analysis also shown that 168 (63.4%) of respondents had opinion either (strongly agree or agree) that community was capable of meeting operation and maintenance cost of the water supply. However, the remaining 97 (36.6%)

respondents did not believe (disagree) that beneficiary community was capable of meeting operation and maintenance cost. Project financing concerning source of fund examined as majority 246 (92.8%) and 252 (95.1%) respondents had found to believe that water supply project was implemented by government and non-governmental organization (donors) respectively. However, project financing analysis examined that majority 249 (94%) respondents had revealed source of fund was not community.

The finding also investigated that majority 173 (65.3%) of respondents found to believe either (strong disagreement or disagreement) with statement that the goals and objectives of the water supply project were clear, However, (38.9%) of respondents had revealed positive perception (agreement). Similarly, 181 (68.3%) of respondents had shown either (strong disagreement or disagreement) with statement that responsibility and line of authority of project management team from both government and donors side were properly defined, while only 84 (31.7%) of respondents had revealed positive perception (agreement). The finding in table also investigated that 159 (60%) of respondents had either (strong disagreement or disagreement) with statement standard project management tools and techniques such as work plans, monitoring and evaluation plans were used for managing water supply project. However, 106 (40%) of respondents had revealed agreement as standard tools and techniques were used.

Project organization and management practices analysis also investigated that, 158 (59.6%) of respondents had revealed either (strong `disagreement or disagreement) for the statement progress of water supply project implementation and project team work was frequently reported in project meetings. This indicates that there was not adequate information flow in different stages of water supply project implementation forth and back among project team while 107 (40.4%) of study respondents had positive opinion (agreement) for the statement. Similarly, 173 (65.3%) of respondents had shown either (strong disagreement or disagreement) on the statement that there was adequate, quality and timely communication within the project team while (34.7%) of respondents had revealed positive opinion (agreement) for the statement.

According to community training evaluation, 167 (63%) of respondents had revealed either (strong disagreement or disagreement) that training conducted on community contribution in cash and in kind for water supply project beneficiary members, while (37%) of respondents had revealed that they got training on necessity of contribution in cash and kind for their water

supply project implementation. Similarly, table 10 below noted that 179 (67.5%) of respondents had revealed either (strong disagreement or disagreement) that they did get training on how much and why they pay water tariff, while 86 (32.5%) respondents had revealed that they did get training on the same issue.

In further analysis, 159 (60%) of respondents had revealed either (strong disagreement or disagreement) that they did get training on how to protect and how to use water supply after project completion, while 106 (40%) of respondents had revealed that they got training in relation with protecting and way of using their water supply project. Table 10 also evaluated that, 171 (64.5%) of respondents had revealed either (strong disagreement or disagreement) that village level management did take scheme management committee training for their water supply project, while 94 (35.5%) of respondents had revealed that village level management did have scheme management training. The finding in table also evaluated that, 180 (67.9%) of respondents had revealed (either strong disagreement or disagreement) that the community training over all water supplies project management was considered safe environment, effective communication and frequent practice. However, 85 (32.1%) of respondents had shown that the training for community considered safe environment effective communication and frequent practice.

The finding indicates that majority 160 (60.4%) of respondents had revealed that their water supply schemes have been serving community with fluctuation while 105 (39.6%) of respondents had agreed that their water supply scheme have been giving service without fluctuation. Similarly, 173 (65.3%) respondents had revealed disagreement for the statement community water supply scheme reliably (without change in initial yield). However, (34.7%) respondents had indicate that their water supply scheme have been giving service with change in its initial yield. The finding also indicates that relatively large size 160 (60.4) respondents had revealed that community water supply scheme have been serving with change in waiting time (queue) while only 1 (.4%) respondent has undecided opinion. However, 104 (39.2%) respondents had revealed that their water supply scheme have been giving service without change in waiting time (queue). Large size 158 (58.9%) respondents had revealed that there was no community member's equal responsibility about water supply scheme while only 1 (.4%)



respondent had reflected undecided opinion. However, (40.8%) respondents had revealed that their community has been sharing equal responsibility for water supply scheme management.

Large size 162 (61.1%) respondents had revealed that the community did not have practice about equal ownership on water supply scheme while 1 (.4%) respondent had reflected undecided opinion. However, 102 (38.5%) respondents had revealed community did have practice about equal ownership for their water supply scheme. Substantial size 204 (77%) respondents had revealed either (strong disagreement or agreement) that there was spare parts availability in community water supply management store. However, 61 (23%) respondents had revealed (agreement) that there were spare parts in community store. On the other hand, large size 189 (71.3%) respondents had revealed (agreement) that district operation and maintenance team have been providing technical support for community operation and maintenance team while 1 (.4%) respondent had shown undecided opinion. However, 75 (28.3%) respondents had revealed that there was no district operation and maintenance team technical support for community operation and maintenance team.

According to correlation analysis there was positive relationship between dependent variable sustainability of water supply project and independent variables such as, community participation, project financing, project organization management practices and community training (.042, .035, .273\*\* and .358\*\*) respectively. The positive relation indicates that there is correlation between factors affecting sustainability and sustainability of Cheha Woreda water supply project. Thus, project organization management practices and community training as factors affecting sustainability of water supply project in Cheha Worega had a significant P-values ( $P < 0.01$ ) confidence level and their significance value were  $p = 0.00$  and  $p = 0.00$  respectively. While community participation and project financing had positive but not a significant p-values were  $p = .496$  and  $.572$  respectively. This implies that project organization management practices and community training were the most significant factors affecting water supply project sustainability in Cheha Woreda.

With regard to regression analysis, the adjusted R square value was 0.142 which indicates low degree of goodness of fit meaning that about 14% of the variance on the dependent variable i.e. project sustainability can be explained. On the other hand, the ANOVA shows the F-test value=11.957, sig=0.001. This implies that significant relationship existed between the

dependent variable (project sustainability) and the four independent variables namely community participation, community training, project financing and organization management practices.

In terms of the regression coefficient, community training and organization management had t-test result= 4.94, sig= 0.001 and t-test result= 2.88, sig= 0.004 respectively. This indicates that both community training and organization management were statistically significant at  $P < 0.05$  level. Thus, the null hypothesis estimated for these two independent variables rejected. It is possible to conclude that the two independent variables had an effect on project sustainability.

## **5.2. Conclusion**

This study sought to evaluate the factors affecting sustainability of water supply project in Cheha Woreda. The study concludes that beneficiary community participation in project initiation phases such as conception; design, implementation, operation and maintenance affect sustainability of water supply project. The beneficiary community participation ensures that project conception from their initial opinion considering norm, habit, culture and socio-economic status in relation with drinking water supply shortage problem. Ensuring community participation as a factor affecting sustainability of water supply project increases community ownership of project by enhancing their willingness and positivity to effectively protect their scheme and manage overall project system. Similarly, source of project fund whether it be from government or from donors was also found as a factor affecting sustainability of water supply project. Thus, there was the need of adequate fund for implementing as well as operation and maintenance of water supply project according to design, plans and based on monitoring and evaluation feedback. The water technology used for installation should consider the depth of wells in relation with carrying loads of rods and pipes as well as trench depth in case of gravity water supply project and financial need for all type of technology should not be heavy to incur operation and maintenance cost.

Therefore, higher operation and maintenance cost would be difficult to meet easily by beneficiary community and it may lead to basic water supply sustainability problem.

The researcher also concluded that project organization and management practices were majorly affecting factors sustainability of water supply project. Hence, project management practices

such as making objectives and goals statement clear for all stakeholders, defining responsibility and line of authority for water supply management chain, application of project management tools and techniques: work plans, monitoring and evaluation, implementation progress and project team work report and adequate, quality and timely communication within project team ensure that water supply project are implemented as expected quality, within schedule and budget.

Community and scheme management committee training was also concluded as major factor affecting water supply project sustainability in Cheha Woreda. Trained community would be more knowledgeable and skillful to protect and properly use their water supply project while trained operation and maintenance team would be more efficient in operating water supply structure thus minimize breakdown and sustainability fail. Trained beneficiary community ensures that prompt maintenance help to avoid further complication and handle with cheap price timely.

### **5.3. Recommendations**

Based on the study finding and conclusion, the researcher has formulated the following possible recommendations.

- All beneficiary community including disabled people and women should be mobilized and participated right from conception and design to implementation of water supply project. Thus, project implementers have to accept opinion of beneficiaries in appreciation and convince them in consensus on basic technical issues. This is recommended to ensure community ownership towards their project.
- The study also recommended that project implementers (government and non-governmental organizations) should first set organized structure and establish scheme level water supply management committee with clear line of authority and responsibility.
- Training for all beneficiary community on why they contribute in kind and in cash during water supply project implementation, on how much and why they pay water tariff, on how to protect and how to use after water supply project completion, and training for management committee on how to manage beneficiary community in terms of, water

collecting time, water scheme guarding, tariff collecting and documenting are recommended.

- The study also recommended other crucial point that all intended trainings for beneficiary community and scheme management committee should consider safe environment in sense of attracting audience (free of sound disturbing, ventilated training hall, appropriate toilet and water supply and other refreshment requirements to control audience attention), effective communication (visual, auditory and kinesthetic) methods and frequent practice in training sessions as well during field apprentices.
- Scheme care taker should take especial operation and maintenance training supported by field practice that can enable them for minor maintenance skill in the absence of district operation and maintenance technical team and spare parts should be available in community scheme management store.
- The objective and goal statement of the water supply project should be clearly formulated and informed for all stakeholders so as to know what will be expected from each entity who have part in project sustainability.
- Water supply project total cost that funded from implementers and contributed by beneficiary community should be announced for all stakeholders that could give them insight about the magnitude of irreversible huge cost so as to take care of their project.
- Monitoring and follow up activities should be conducted within implementation phase to identify defects before it become irreversible. Evaluation should be also conducted to document good practices and challenges and final closing report should be announced for all stakeholders.

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## **APPENDIX I**

### **Permission letter**

Dear respondents

This questionnaire is meant to evaluate factors affecting sustainability of water supply project in your district as well as Kebeles and villages and thereby make valuable contribution towards the future development, community participation, project financing, project organization management practices and community training. To that effect, I would like ask you just to give 20 minutes and cooperate by responding accordingly and I assure you that all information gathered will be used solely for the study purposes only and the identity of the community member, water supply management and key interviewee/informant, who share their view, will not be revealed.

Researcher    Desalegn Lejib

## APPENDIX

### Survey questionnaire for beneficiary community and water supply scheme management committee

#### Part I: Demographic and socio-economic characteristics of the respondents

- Sex    1. Male        2. Female
- Age range of the respondents    1. 20-35    2. 36-45    3. 46-55    4. Above 56
- Education status of the respondent    1. Illiterate    2. Read and write    3. Grade 1-6    4. Junior (7-8)    5. High school (9-10)    6. Preparatory (11-12)    7. Above 12 Grade
- Main occupation of the respondent    1. Farming    2. Trading    3. Farming and trading    4. Artisan/Crafts    5. Animal rearing    6. Others
- Annual income of the respondent    1. 3000-6000    2. 6001-9000    3. 9001-12000    4. Above 12,001

A five-point Likert-type measurement scale is adopted for the respondents' rating of items. Sequentially, ordering strong disagree (SDA), disagree (DA), undecided (UD), agree (AG), and strongly agree (SAG).

#### Part II: survey questionnaires for factors affecting sustainability of water supply project

S.N	Measurement factors	Likert scales				
		SDA (1)	DA (2)	UD (3)	AG (4)	SAG (5)
1	<b>Community participation</b>					
1.1	All beneficiary community have participated in conception, design and implementation of the water project					
1.2	Beneficiary women and disabled people have participated in the membership of community structures in management of water project.					

1.3	There is community structures in place for management of water projects					
<b>2</b>	<b>Project financing</b>					
2.1	Beneficiary community have awareness about the total cost of water supply project					
2.2	Beneficiary community members have made financial contribution for implementation and maintenance of water supply project					
2.3	Beneficiary community is capable of meeting the cost of operation and maintenance water supply projects without further donor support					
2.4	Source of fund for water supply project was government					
2.5	Source of fund for your water supply project was community					
2.6	Source of fund for your water supply project was donor					
<b>3</b>	<b>Project organization management practice</b>					
3.1	Water supply objectives and goals are clear for all stakeholders					
3.2	Responsibility and lines of authority of Woreda WASH steering committee and scheme WASH committee are properly defined					
3.3	Standard project management tools and techniques such as work plans, monitoring and evaluation plans were used for managing water supply project					
3.4	The progress of water supply project implementation and project team work is frequently reported in project meetings					
3..5	There was adequate, quality and timely					

	communication within the project team					
<b>4</b>	<b>Community trainings</b>					
4.1	Your community have taken trainings on why they have been contributing in kind and in cash during water supply project implementation					
4.2	Your community have taken training on how much and why they pay water tariff					
4.3	Your community have taken training on how to protect and how to use after water supply project completion					
4.4	Water supply scheme management committee have taken training on how to manage beneficiary community in terms of , water collecting time, water scheme guarding, tariff collecting and documenting					
4.5	Trainings for all community have considered safe environment, effective communication and frequent practice					

Part III: survey questionnaires for sustainability of water supply project

S.N	Measurement factors	Likert Scale				
		SDA	DA	UD	AG	SAG
<b>5</b>	<b>Sustainability of water projects</b>					
5.1	Your water supply scheme have been serving beneficiary community without fluctuation					
5.2	Your water supply scheme have been serving beneficiary community reliably without change in initial yield					
5.3	Your water supply scheme have been serving beneficiary community without change in waiting time (queue)					

5.4	All beneficiary community members did have equal responsibility to their water supply scheme					
5.5	All beneficiary community did have practice of equal ownership to their water supply scheme					
5.6	Necessary spare parts were always available in community water supply management store					
5.7	District operation and maintenance team have been providing technical support for community operation and maintenance team					

Part IV: survey questionnaire for key interviewees from district office (general)

1-Who are water supply project initiator?

2- How do you rate community participation in decision making related to water supply planning implementation?

3- What type of trainings was given to water committee members and beneficiary community from NGOs and Government?

4-How is community water supply management committee report to District steering committee?

5- Who are responsible to monitor and maintain water supply schemes in the community and how often?

6-what is the role of Kebele administration, health extension workers and development agents in community water supply projects?

7-What are your plans over non-functional water supply schemes in the community?

8-what are fund sources for water supply project; construction cost, operation and maintenance cost?