
# A Study on Smallholder Farmers' Use of Information and Communication Technologies (ICT) to Get Access to Agricultural and Market Information

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This is to certify that the thesis prepared by Bayissa Urgesa, entitled *A Study on Smallholder Farmers' Use of Information and Communication Technologies (ICT) to Get Access to Agricultural and Market Information* and submitted in partial fulfillment of the requirements for the Degree of Master of Arts in Journalism and Communication complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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# ABSTRACT

A Study on Smallholder Farmers' Use of Information and Communication Technologies (ICT) to Get Access to Agricultural and Market Information

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Information and Communication Technology is believed to play a pivotal role in disseminating information and linking farmers with clients in the agricultural value chain. The purpose of this study was to assess farmers' use of Information Communication Technology to get access to agricultural and market information. The study was guided by three basic research questions and, Roger's Diffusion of innovation theory as a theoretical framework. Both qualitative and quantitative approaches were employed in the study. Quantitative data was collected from 80 purposely selected smallholder farmers using interview questionnaires, while qualitative data were gathered from woreda agricultural office, market promotion experts and DAs. SPSS version 20 was used for the quantitative data coding and analysis.

The findings of the study showed that Agricultural extension workers or DAs served as the main source of agricultural information, followed by radio and mobile phone. Radio was mentioned as the main sources of market information by the respondents. The study identified that farmers who are selling their products to cooperative associations are getting advantage on market price than those who are selling to small traders. Barriers such as language, lack of operating skills and illiteracy have also been found as obstacles to adopt the ICT technologies. The respondents are found at different stages of technological adoption. With regard to traditional ICT such as radio and

television, the respondents reached the stage of confirmation by continuing to use the technology for agricultural and market information.

However, since the majority of the respondents do not have access to some modern ICT devices and applications such as computer, they are not exposed to those ICT technologies and its application. Hence they have not even reached the stage of knowledge, according to Rogers' stages of adoption process. For those who have reached the stages of persuasion, especially with regard to mobile telephone, the respondents knew the advantage of the technology and are willing to adopt; but lack of infrastructure such as electricity and network connections have become a problem. The study concluded that modern ICT such as mobile phone are not properly used by farmers to get access to agricultural and market information for various reasons such as lack of technological infrastructure, lack of basic operation and usage skills; and language barriers.

Recommendations were also made based on the conclusions drawn from the findings that Ethio telecom should work together with Ethiopian electric power corporation in order to solve electric and network disruption so that farmers can adopt and make use of the ICT technology.

Moreover, it is highly recommended that farmers should get ICT basic operation and usage skills in their village on adult literacy program scheduled by the government, so that they will be able to operate and use the ICT.

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# LIST OF ACCRONYMS

AAU- Addis Ababa University

ADLI- Agricultural Development Led Industrialization

BCO- Building Communication Capacity

CSA- Central Statistical Agency

GDP- Gross Domestic Product

GIS- Geographical Information System

GPS-Global Positioning System

ICT- Information Communication Technology

IICD- International Institute for Communication and Development

ITU- International Communication Union

MOFED- Ministry of Finance and Economic Development

OECD- Organization for economic cooperation and development

UNDP- United Nations Development Program

WSIS- World Summit on the Information Society

FAO- Food and Agriculture Organization

PADETS- Participatory Demonstration and extension system

FTC- Farmers Training Center

DA- Development Agents

ECX- Ethiopian Commodity Exchange

OCFCU- Oromia Coffee Cooperatives Union

# CHAPTER ONE: INTRODUCTION

## 1.1.Background of the Study

The history of humanity is the history of the invention of tools, techniques and advanced technologies. In the past, human beings used Stone, Copper and Bronze, Iron and Wheels and Steam Engine as a means to make productive tools. The historical periods are named after these devices as Stone Age, Copper and Bronze Age, Iron Age and Industrial Age or Industrial Revolution (Neil, 2002).

The Information Age is a period in human history characterized by the shift from industrial revolution brought to an economy based on information technology (Alberts and Papp, 1997). The start of the Information Age is associated with the Digital Revolution and modern information and communication technologies such as Computers, New Media Devices, Digital Satellites, and cellular mobile network, etc

The United Nations Development Programme (2001:2) defined Information and Communication Technologies (ICTs) as,*"…. information-handling tools- a varied set of goods, applications and services that are used to produce, store, process, distribute and exchange information."*

ICT is an umbrella term that generally covers the `new' ICTs of computers, the internet, satellite wireless technology and digital libraries. But ICTs also encompass the more conventional technologies or the `old' ICTs such as telecommunications infrastructure, cell phone, Radio, Television, Newspapers. Hence, ICTs have existed for a very long time, since the invention of radio and television. However, in recent times, ICTs have received a greater attention, with the advent of the computer, Internet, and the World Wide Web (Reddi, 2002).

In today's world, there is hardly any aspect of modern living that does not require the use of information technology (Dutta & Bilbao-Osorio, 2012). All sectors of the economy that range

from agriculture to medicine, from engineering to banking and from Military to Space Science are benefiting from ICT technologies (Alberts and Papp 1997).

At their most fundamental level, ICTs enable organizations to be more productive, thereby spurring economic growth and helping firms to be more competitive. ICTs can also expand the reach and effectiveness of social development projects and have already yielded important benefits in such areas as healthcare, education, and environmental preservation. Public-sector uptake of ICTs is also making governments more efficient and their decision-making more transparent (ITU, 2004).

With specific reference to agriculture, modern farms make use of computers and other Information & Communication technologies with a farm management system to keep track of inputs and outputs, weather forecast, early warning and decision support systems for crop management (Wolfert & Kempenaar, 2012).

The difference ICTs can make, particularly in the area of agricultural development and food security, was among the issues addressed during the World Summit on the Information Society (WSIS) Plan of Action. The plan calls for measures to ‘ensure the systematic dissemination of information using ICTs on agriculture, animal husbandry, fisheries, forestry and food, in order to provide ready access to comprehensive, up-to-date and detailed knowledge and information, particularly in rural areas.

ICT can be used in almost every step of agricultural production that include among others in input procurement, production, distribution and marketing of agricultural produce. Knowledge, communication and information exchange have influenced farmers decisions on what to plant,

when to plant it, how to cultivate and harvest and where to store and sell and at what price (Winrock, 2003). The integration of ICT can help to improve the performance of agricultural development (Woodburn *et al*., 1994).

Any ICT intervention that improves the livelihoods of poor rural families will likely have significant direct and indirect impacts on enhancing agricultural production, marketing and post-harvest activities – which in turn can further contribute to poverty reduction (Chapman and Slaymaker 2002).

This study assesses how smallholder coffee growing farmers in Limu District of Jimma Zone of Oromia Region use ICTs to get information that enhance agricultural productivity and market related information.

## 1.2. Statement of the Problem

Access to accurate agricultural extension and market information is critical for farmers. In small farm situation, farmers have little information about agricultural inputs and output prices in nearby towns and urban areas. In Ethiopia, within the framework of Agriculture Development Led Industrialization, the government initiated agricultural extension package known as Participatory Demonstration and Training Extension System (PADETS) that started in 1995.

The extension package includes the supply and distribution of modern inputs like fertilizer and improved seeds, development of small-scale irrigation, conservation of natural resources and environment, agricultural research and extension work as well as marketing and price policy. Over the years, the packages have been diversified to address the needs of farmers who live in different agro-ecological zones of the country. Currently, PADETES promotes packages on cereals, livestock (dairy, fattening and poultry), high economic value crops (oil crops, pulses, vegetables and spices), improved post-harvest technologies (handling, transport and

storage),agro-forestry, soil and water conservation and beekeeping developed for different agro-ecological zones (highland mixed farming system, highland-degraded and low moisture, lowland agro-pastoralist and lowland pastoralist zones) (Belay, 2003).

Increasing the number of extension agents and improving the service delivery capacity of extension agents were considered instrumental in expanding the use of extension packages (Mulat, 2002) Under PADETES the major tasks of extension agents include organizing demonstration trials, assisting farmers in obtaining agricultural inputs and channeling farmers' problems to the relevant organizations, particularly to the district agricultural office.

The provision of such agricultural information using extension agents is by no means sufficient. In his review of Ethiopia's Agriculture Extension Program, Belay (2003) found out that Extension agents are under pressure to work with as many farmers as possible. Based on his findings, in many parts of the country, one extension agent may be required to supervise the demonstration plots of more than 300 farmers. Moreover, extension agents are quite often overloaded with different assignments, which are, in most cases, not related to their normal duties.

Adopting the ICT innovations for agriculture is extremely interesting subject area and it comes under the subject matter of Agricultural Extension. ICTs increases access to relevant information for smallholder farmers on production, technology, weather, finance and marketing of farm products. Such information is instrumental in making important farming and marketing decisions such as what sort of crops and commodities to grow in the future and the best time and place to sell and buy agricultural inputs and outputs. Any relevant agricultural information which is driven by ICTs can help farmers to make informed decisions about their farming enterprise, could potentially increase agricultural productivity and income. ICT is now being used in

agricultural extension to disseminate personalized and timely expert advice without necessarily offering face-to-face services to the farmers (Chapman and Slaymaker 2002).

Despite the broad potential of ICTs that benefits farmers; they have not been spread evenly. The developing countries particularly the rural population have been significantly been left out of the information revolution. This digital divide happens largely due to the high cost of deploying ICT infrastructure, low literacy level, low income and limited number of service providers (WSIS, 2008). Modern communication technology penetration in Ethiopia remains one of the lowest in the world.

As already mentioned this study assesses how smallholder coffee growing farmers in Limu District of Jimma Zone of Oromia Region use ICTs to get information that enhance agricultural productivity and market related information.

## 1.3. Objective of the study

### 1.3.1. General Objective

The general objective of this research is to assess and analyze how small-holder farmers' of Limu Kosa Woreda use ICTs to get agriculture and market related information. To achieve the relevant results of this study, the following specific objectives were addressed:

### 1.3.2. Specific Objectives

- Identify types of Information and Communication Technologies (ICT) smallholder farmers use to get agriculture and market related information.
- Assess smallholder farmers' attitude towards Information and Communication Technologies (CIT)

- Identify major factors/barriers affecting smallholders in ICT usage/adoption for agricultural and market information.

### 1.4.Research Questions

Based on the specific objectives, the study tries to address the following main research questions:

- What are the major Information and Communication Technologies (ICT) farmers use to get access to agricultural and market information?
- What are the attitudes and perception of smallholder farmers towards Information and Communication Technologies?
- What are the major factors/barriers that hinder farmers' uptake of Information and Communication Technologies?

### 1.5.Significance of the study

The study aims to provide a wider picture of the challenges and opportunities smallholder farmers come across in using ICT to get access to agriculture extension and market related information. Identifying the use of ICTs and factors that influence ICT use helps stakeholders and service providers who work with smallholder farmers to put into consideration these important factors.

The researcher believes that this study provides basic information for further research on ICT-driven agricultural extension and market information in Ethiopia. Furthermore, the findings in this study can be used to develop a benchmark for similar ICT use studies targeting agricultural communities. The results of the study may enable researchers, policymakers, service providers

and other interested parties better understand the ICT needs of agricultural communities in the country.

### 1.6.Scope of the Study

The study was developed to assess farmers' use of ICT to get access to agricultural and market information in Limu Kosa woreda of Jimma zone. It identified the types of ICT they use and access, their attitudes towards the use ICT and challenges that hinder them from adopting the technology. Therefore, the study was delimited to the coffee growing farmers of the Limu Kosa woreda.

### 1.7.Limitation of the Study

Shortages of secondary sources have compelled this research finding to crosscheck with other research conducted on the area. Moreover, due to lack of time, resource and financial constraints, the study did not include all the small holder farmers in the study area.

# CHAPTER TWO: REVIEW of RELATED LITERATURE

## 2.1. Introduction

Effective adoption of Information and Communication Technologies (ICT) has a proven record of attaining significant economic, social and environmental benefits at local, national and global levels. In the developed world, ICT demonstrated that it is the pivot of socioeconomic development. With the help of ICT, these countries have successfully transformed their economy to be knowledge based. Today there is almost no economic sector that is not supported by ICT applications (OECD, 2005).

However, the developing countries have been significantly been left out of the information revolution. Especially, rural communities are neglected and deprived of substantial access to ICTs. The digital divide happens largely due to the high cost of putting up modern ICT infrastructure, low literacy, low income and limited number of service providers. The absence of basic telecommunication infrastructure, dominance of the English language in the contents of the internet and lack of demonstrated benefit from ICTs to address ground-level development challenges contributed to the low level of usage of ICT services, (Gurumurthy, 2004).

In the subsequent section, the paper will discuss the role of ICT in development and the academic debates revolving around.

## 2.2. Information and Communication Technology for Development (ICT4D)

Over the past several years, a broad international consensus has emerged that information and communications technologies (ICTs) offer a potentially powerful mechanism for promoting social and economic growth. Due to that, Information and Communication Technologies (ICTs)

and development seem to have found each other and merged into a new field, which is often called ‘ICTs for Development’ (ICT4D) ( Lie, 2010 ).

ICT 4 D entails by using ICTs, the poor and marginalized or target groups of development will start a communication process that makes them more aware of their problems, their potential for self-help and change possibilities, which in turn empowers them to take appropriate action (Swiss Agency for Development Cooperation, 2007).

Debates revolve on the importance of ICT for Development among academic and policy making circles. On the one hand, there are scholars that mention the remarkable success gained by using ICTs to help underserved communities and to create new opportunities in developing countries. For instance, these technologies are creating new possibilities for improving health and nutrition, expanding knowledge, stimulating economic growth, instituting decentralized governance and service provision and empowering people to participate in their communities (ITU, 2004).

These attributes make ICTs enthusiasts to be optimistic that technologies themselves would transform societies and spur local economic growth and expand the effectiveness of development initiatives. Based on such premises, in the 1990s, many ICT projects such as rural tele-centers were established in developing countries (Swiss Agency for Development Cooperation, 2007).

Yet other scholars and development organizations cite examples of unfulfilled expectations and costly ICT investments that did little to improve the lives of the target community (ITU, 2004). After examining different ICT for development (ICT4D) projects in India, Cecchini and Scott (2003) concluded that various top down efforts have resulted in failure.

Those scholars that question the consideration of ICT as a panacea for development stated that there are many barriers to use the technology. Some of the barriers mentioned are cost and

reliability, skills and management, lack of useful content, or a lack of fit between the new technologies and the existing communication needs and flows of the target community (Panos, 2007). The failure has been well summarized by a publication of International Institute for Communication and Development (2006: 11) as follows:

> *Early enthusiasm and claims that ICT would prove to be a panacea for development problems led to a number of false starts that have given ICT rather a bad reputation in mainstream development circles. After years of debate in the field of development about rusting tractors or failed infrastructure projects, and years of experience built up in participatory communications, it feels as though exactly the same mistakes and shortcomings are being replicated in the rush to make the benefits of new ICTs available to all….What has been learned from such 'rusting tractor' scenarios is that success is not derived from inserting advanced communication technology into a poverty-stricken social context, with attendant low levels of literacy and empowerment, and expecting positive transformation to come about naturally.*

While debate is ongoing whether ICT is a panacea for all the development ills in developing countries, there is a certain level of agreement that ICT enable development in areas where other critical relevant elements of socio-economic issues are addressed (ITU, 2004). Scholars such as Dhameja & Medury (2005:1) argue that "…Even though the benefits of ICT come with the tag of a number of constraints in recent years, the developing world is gradually catching up with the technological advancement to solve its socio-economic problems, it is being considered as a panacea for all ills".

### 2.3. Role of ICT in Agriculture

Agriculture is an important sector with the majority of the rural population in developing countries depending on it. The sector faces major challenges to enhance agricultural production. .

Challenges of particular concern include among others lack of improved varieties, water shortages, declining soil fertility, effects of climate change and rapid decrease of fertile agricultural lands due to urbanization. Realizing these opportunities requires compliance with more stringent quality standards and regulations for the production and handling of agricultural produce. (Meena & Singh, 2008).

Despite the challenges, the growing demand for agricultural products offers opportunities for producers to sustain and improve their livelihoods. New approaches and technical innovations are required to cope with these challenges and to enhance the livelihoods of the rural population. Hence, to increase agricultural production, the need for improved agricultural extension has never been greater than now (ibid).

### 2.3.1. ICT as an Agricultural Extension Tool

Extension services help farmers decide what and when to plant, how to prepare for planting and best agronomic practices related to growing improved varieties, dealing with pests and disease, harvesting, and post harvest practices such as packing and storage. Extension services combine educational methodologies such as farmer field schools and demonstration plots as well as advice from extension agents. National ministries of agriculture have hundreds and sometimes thousands of extension agents, and still, farmers often go years without having direct contact with an extension agent (USAID, 2011).

Increasing access to information and communication technologies has brought about new possibilities in every economic sector - including agriculture. Chapman and Slaymaker (2002) stated that adopting ICT innovations for agriculture comes under the subject matter of Agricultural Extension, and the technologies play an important role in addressing the challenges and uplifting the livelihoods of the rural poor.

ICT as an extension tool could enhance the flow of information in the application of agricultural extension services. Ballantyne and Bokre (2003) cited on Sutrisno & Lee (2010) indicated that agricultural extension, which depends to a large extent on information exchange between and among farmers, has been identified as one area in which ICT can have a particularly significant impact.

Bolarinwa & Oyeyinka (2011) stated that there will be timely exchange of agricultural information between the extension agents and farmers if ICT components are integrated in delivery of agricultural information to farmers. Furthermore, these technologies are increasingly being seen as cost-effective and as practical tools to facilitate information delivery and knowledge sharing among farmers, extension agents and other stakeholders (Sutrisno & Lee, 2010).

These technology outputs increase access to relevant information for smallholder farmers on extension services that increase agricultural production as well as information about the weather, finance and marketing of farm products.

ICTs can also use as a means of accessing market information. Awareness of up-to-date market information on prices for commodities, inputs and consumer trends can improve farmers' livelihoods substantially and have a dramatic impact on their negotiating position. Such information is instrumental in making important farming and marketing decisions such as what sort of crops and commodities to grow in the future and the best time and place to sell and buy goods (Stein, 2007).

This technology is offering a great opportunity for other innovative interventions such as ICT banking and money transfer. These types of ICT applications enable farmers, even in the remotest locations, to easily and readily access vital information about market and other related

services (World Bank, 2012). That is why it is often said that the expansion of ICT provides a unique and unparalleled opportunity in providing rural smallholder farmers access to information that could transform their livelihoods.

### 2.3.2. Appropriate ICT technology for Agriculture in Developing Countries

According to Stein (2007) across the developing world, ICT applications that support agricultural development use traditional media such as radio, television, press and ICT-enabled modern channels such as mobile phones, computers, the internet, Geographical Information Systems (GIS) and Global Positioning Systems (GPS).

Debate still rages on which technologies are effective for use in developing countries' agriculture. Jorge (2002:3) and Synman and Synman (2003:234) argue that traditional ICT tool such as rural radios, videos, televisions, slides, pictures and demonstrations are the widest form of communication which have been very successful and have sped up the flow of information in developing countries. Richardson (2005) also supports that simple technology like telephone is a great need and priority in most countries, and produces better results than the Internet and Internet based applications.

According to the McNamara etal (2012) the attractiveness of the newest ICTs lead to a preference for the latest technologies at the expense of older technologies (such as radio), yet the newest, most elaborate, or most innovative technology is not automatically the most appropriate one. The authors suggest an innovative mix of technologies (for instance, radio programs with a call-in or SMS facility for feedback) can be the most cost-effective solution (ibid).

In 2006, IICD analyzed the use of ICT in agriculture in over fifty projects that it supported and concluded that appropriate use of ICT in agriculture requires the application of relevant Combinations of traditional and modern ICT.

Among the deferent ICT channels, both traditional and modern, radio is regarded as suitable to reach the larger parts of societies with a large share of poor and marginalized people. Radio is a cheap medium that can penetrate even remote areas. Any individual can receive it regardless of literacy or education level. Rural radio provides region specific local concerns and feedback and can operate in local languages. Building Communication Opportunities (BCO, 2008: 63), a UK based alliance of 11 development agencies working on information, communications and development explained that "….Until other ICTs can replicate these advantages at the same cost, then it is likely that radio will continue to be the most relevant technology for the rural poor."

Access to mobile phones is growing dramatically in developing countries, especially in rural areas. Mobile phone penetration in the developing world is driven by expanding networks in Asia and in Africa. According to the World Bank (2012), the number of mobile subscriptions in low- and middle-income countries increased by more than 1,500 percent between 2000 and 2010, from 4 to 72 per 100 inhabitants.

Although it is a relatively new phenomenon, evidence of the contribution of ICT to agricultural development and accessing market related information is becoming available from experiences of Asian and African Countries. The World Bank (2012) cited a recent study conducted in Bangladesh, China, India, and Vietnam found that among the total farmers that took in the study 80 percent of farmers in these countries owned a mobile phone and used them to connect with agents and traders to estimate market demand and the selling price of products.

## 2.4. Provision of Agricultural Extension Information in Ethiopia

In Ethiopia, agriculture is the key sector in the Economy as it creates means of livelihoods for about 85 percent of the national population. The growth performance of the overall economy of the country is highly correlated to the performance of agricultural sector. All other sectors of the Ethiopian economy also depend on the performance of agriculture, which provides raw materials, generates foreign currency for the importation of essential inputs and feeds the fast growing population (MOFED, 2010)

The Ethiopian agriculture is characterized by poor quality products, insufficient inputs and poor agronomic practices. The country's development lacks coordinated market linkage that results in "information asymmetry" and lack of trust among trading partners across the country. Small-scale farmers come to the market with little information (Dereje, 2011). They have little or no knowledge about the local and international price of their products (Tsega, 2010).

Farmers have their own informal communication networks where they share information with their fellows. Information sharing among farmers is made easy through meetings in the villages such as in local beer and drinking places, market places, churches, mosques and funeral gatherings. Formal village and district meetings also enhance farmer to farmer communication and information delivery. Despite the inadequate reliability of information and experience of sharing information amongst themselves, communication among farmers remains the main method of sharing information in developing countries like Ethiopia (Churi, 2012)

To enhance the productivity of smallholder farmers and improve food security, the Ethiopian government has designed an overall development strategy known as "Agricultural Development Led Industrialization" (ADLI) strategy, which aims to use agriculture as the base for the country's overall development.

Within the framework of ADLI, the government initiated a new system of agriculture extension known as Participatory Demonstration and Training Extension System (PADETS) that started in 1995. The extension package includes the supply and distribution of modern inputs like fertilizer and improved seeds, development of small-scale irrigation, conservation of natural resources and environment, agricultural research and extension work as well as marketing and price policy (Berhanu, D. Hoekstra and Azage, 2006).

There are several traditional/conventional methods used to provide farmers with access to agriculture related information such as the deployment of Agriculture extension. The Ministry of agriculture is entrusted with the task of developing appropriate extension packages for different farm related activities and various agro-ecological areas of the country. Increasing the number of extension agents and improving the service delivery capacity of extension agents and improving the service delivery capacity of extension agents were considered instrumental in expanding the use of fertilizers and improved seeds (Mulat, 2002)

A total of 8,500 Farmer Training Centers (FTCs) have been established and 63,000 field extension workers (known as development agents-DAs) have been trained. The current extension approach, therefore, follows FTC-based extension system. The FTCs are positioned to facilitate agricultural knowledge and information exchange among researchers, extension workers and farmers. Woreda level agricultural offices are responsible for managing the operation of FTCs with the support of zonal and regional agriculture bureaus and are the frontline administrative structure for implementing agricultural extension services in the country (UNDP, 2012).

The basic objectives of extension program among others include ensuring that farmers acquire supplies of basic consumer goods and agriculture inputs in sufficient quantity and quality, provide easy and wide access to market for all their output and assist them to increase their

output and change farmers' orientation from subsistence to market production. Improving rural markets is the other major component of the strategy (Federal Ministry of Infomration, 2001)

Most appropriate technological options including optimal use of inputs (improved seeds and agro chemicals such as fertilizers & Pesticides), improve farming methods and agronomic practices, access to credit and loans, off-farm income-generation options and weather climate change, conservation related topics are some of the information that farmers require to increase their productivity.

The provision of such information using conventional method is by no means sufficient. This is because of limited number of agricultural extension workers in relation to the number of farmers, lack of funds for supporting farmer field schools and farmers' demonstration plots constrain the flow of information reaching farmers. Inadequate infrastructure, localized technical information, as well as budgetary shortfalls are also some of the other major constraints that inhibit effective agricultural knowledge management and delivery of agricultural extension services in Ethiopia (UNDP, 2012)

Hence, efforts are underway to send out agricultural information to farmers using traditional mass media and modern ICT applications. *Various attempts are* being made by the government & others to provide farm related information using Radio, TV, Newspaper and other ICT-enabled modern channels such as mobile phones, Interactive Voice Radio and etc. For instance, the Ethiopian Commodity Exchange (ECX) release price information that is stored in its central database and publish the data on its website and make it accessible to farmers in different part of the country using boards. To reach a wider audience, this market information is broadcasted by means of radio, TV or mobile phones, thereby creating a 'level playing field' between producers and traders.

## 2.5. The Development and Services of ICT in Ethiopia

The advent of modern Information and Communication Technology started in Ethiopia, with the introduction of telecommunication that dates back to 1894. Written sources tell that, it was at that time, the first long-distance telephone line in the country was installed between Addis Ababa and Harrar. Then immediately an extensive open wire line system was laid out linking the capital with all the important administrative cities of the country. Ethiopian Telecommunications Corporation (now Ethio Telecom) is the oldest public telecommunications operator in the African continent (ITU, 2002) .

During Italian invasion, the whole telecommunication network was destroyed in the country. The Telephone, Telegraph and Postal services were re-organized in 1941, after the country fully regained its independence. In 1952 the Imperial Board of Telecommunications (IBTE) was established by proclamation No. 131/52. The Board had full financial and administrative autonomy and was in charge of the provision and expansion of telecommunications services in the country (Worku, 2005).

In 1996, the government established by regulation 10/1996, the Council of Ministers set up the Ethiopian Telecommunications Corporation (ETC), during the same year the government setup a regulatory body the Ethiopian Telecommunication Agency (ETA) by Proclamation 49/1996 (ibid). Under the supervision of the ETA, the principal duty of ETC is maintaining and expanding telecommunication services in the country and providing domestic and international telephone, telex, and other communication services. ETC was the only operator of telecommunication services in the country.

In recent years, the Government of Ethiopia has taken measures to harness the benefits of ICTs. One of the measures taken by the government is the establishment of the Ministry of

Communication and Information Technology (MCIT) - formerly the Ethiopian Information and Communication Technology Development Agency (EICTDA). Overseeing all ICT related activities in the country fall within the mandate of the newly established Ministry.

The national ICT policy of the country was drafted in 2005 with the vision of attaining the social and economic well being of the people of Ethiopia through the exploitation of the opportunities created by ICT for rapid and sustainable socio-economic development, a robust democratic system and good governance (http://www.mcit.gov.et/web/english/ict-policy-and-regulatory-environment). Also, MCIT has formulated a national ICT development policy and strategy of the country and engaged in implementing the strategy.

The Ministry website (http://www.mcit.gov.et/web/english/ict-sector-development-in-ethiopia) reads about the overall intent of the ICT development policy and strategy as follows:

> *The Ethiopian Government has made the development of information and communications technology (ICT) one of its strategic priorities. The endorsed and currently enforce ICT policy is a demonstration of its commitment to the development of ICT both as an industry and as an enabler of socio-economic transformation. The policy stems from the recognition by the Government of ICT as the key driver and facilitator for transforming Ethiopia's predominantly subsistence-agriculture economy to an information and knowledge-based economy and society, effectively integrated into the global economy.*

Lately, the national operator changed its name from Ethiopian Telecommunication Corporation to Ethio-telecom and continued to enjoy the virtual monopoly of all ICT services. Ethio telecom provides dialup Internet, CDMA 2000 wireless Internet, ADSL and wireless Internet using AIRONET, VSAT, and EVDO. Mobile telecommunications grew from a mere 1.2 million subscribers in 2007 to around 23.7 million subscribers in 2013. The voice communication

geographic coverage has reached 64%, a progress by all standards considering Ethiopia's start from a very lower base in 2005. Ethiopia's landline telecommunication network stands at 790,188 subscribers, representing about 1% of the population (ibid).

The country has also seen a substantial growth in mobile Internet users after the start of CDMA 1 X services across the country. The use of mobile for Internet is growing. A survey done by ICT Africa Network shows that the proportion of mobile Internet users was 1.2% in 2012 driven by increasing use of social networks such as Facebook. The country reached the million Facebook users mark in 2013 with an increase in the users by 20% between 2012 and 2013. The demand for mobile services and Internet access continues to grow exponentially (ibid).

Furthermore, Ethio telecom uses VSAT technology for the delivery of services to various government networks such as Woredanet, Schoolnet, and Agrinet and to Non-Government Organizations. Agrinet, which is tailored to agriculture, is a network that links more than 30 research and operational agricultural centers together to stimulate the growth of this cornerstone of the economy.

**Table: Ethiopia's Communication Sector Statistics Source: Ethio Telecom**

| | **Service Type** | **Subscribers in 2013** |
|---|---|---|
| 1 | Fixed line telephone | 790,188 (June 2013) |
| 2 | Public telephone | 5,359 |
| 3 | CDMA telephone | 136,744 |
| 4 | Dialup internet | 76,504 |
| 5 | Internet and data | 221,000 |
| 6 | Mobile Telephone | 23,637,007 |

| | | |
|---|---|---|
| 7 | WCDMA Telephone | 296,897 |
| 10 | Agrinet | 49 |
| 11 | Multimedia | 6,500 |
| 12 | Roaming | 444 |
| 13 | CDMA 1X | 104,003 |
| 14 | GPRS | 4,208,989 |
| 15 | EVDO | 76,445 |
| 16 | Gota | 1,010 |
| 17 | Internet bandwidth | 8.686 Gbps |

The government is continuing to invest in the communications infrastructure. Expansion projects were signed between Ethio Telecom and two Chinese companies - Huawei Technologies and Zhongxing Telecom Corporation (ZTE) in 2013. Despite the attempt by the government to increase the ICT infrastructure, Ethiopia remains one of the countries where low level of mobile communication and internet penetration exist.

## 2.6. THEOARETICAL FRAME WORK

Since technological change and innovation advanced very fast in the ICT age, it is difficult to get one single theory that captures the whole process of adoption. In this section, attempt will be made to discuss the dominant theory, modern intellectual thoughts and debates surrounding ICT adoption.

### 2.6.1. Roger's Diffusion of Information

The past four decades have witnessed numerous attempts to understand the mechanisms of the "adoption of technological innovation". Among the scholars that dealt with the concept of

adoption of technologies, Everett Rogers professor of communication studies popularized the theory of diffusion in his book *Diffusion of Innovations*.

Diffusion of innovation is a theory that seeks to explain how, why, and at what rate new ideas and technology spread through cultures. According to Rogers (1995) “Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system.” Rogers argues diffusion depends on four elements. These are the innovation itself, communication channels, time, and a social system in which diffusion takes place. These elements work in conjunction with one another (Rogers, 2003).

The key elements in technological diffusion are defined by Rogers as follows:

| **Element** | **Definition** |
|---|---|
| Innovation | "An idea, practice, or object that is perceived as new by an individual or other unit of adoption". |
| Communication channel | "the means by which messages get from one individual to another". |
| Time | "The innovation-decision period is the length of time required to pass through the innovation-decision process".<br>"Rate of adoption is the relative speed with which an innovation is adopted by members of a social system" |
| Social system | "A social system is defined as a set of interrelated units that are engaged in joint problem solving to accomplish a common goal". |

According to Rogers’s diffusion of information, Knowledge, persuasion, decision, implementation, and confirmation are the stages/processes that the individuals go through to

accept new technological innovations. If the innovation is adopted, it spreads via various communication channels.

**Technological Innovation Adoption Framework by Rogers**

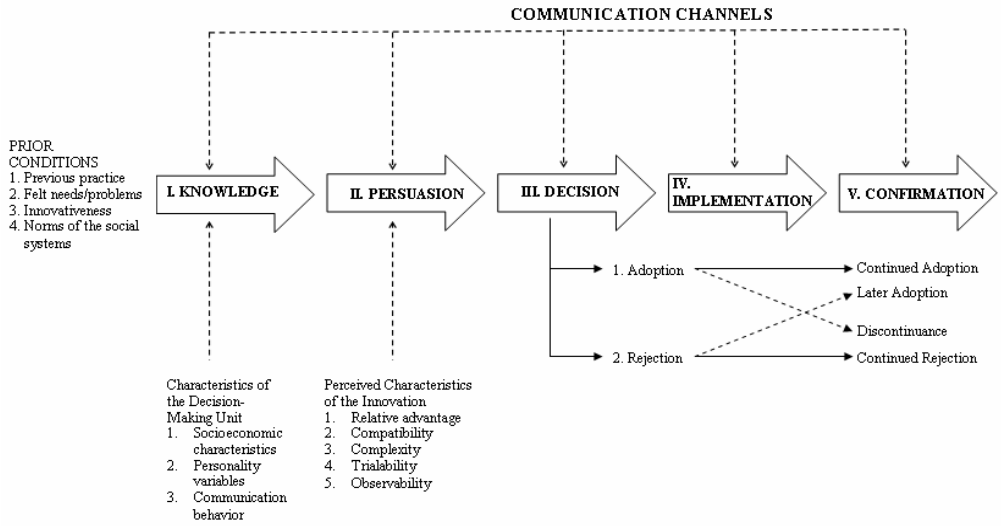


**Figure 3: Technological innovation adoption framework**

Rogers defined/explained the 5 stages of the technological adoption process as follows:

| Stage | Definition |
|---|---|
| Knowledge | In this stage the individual is first exposed to an innovation but lacks information about the innovation. During this stage of the process the individual has not been inspired to find more information about the innovation. |
| Persuasion | In this stage the individual is interested in the innovation and actively seeks information/detail about the innovation. |
| Decision | In this stage the individual takes the concept of the change and weighs the advantages/disadvantages of using the innovation and decides whether to adopt or reject the innovation. Due to the individualistic nature of this stage Rogers notes that it is the most difficult stage to acquire empirical evidence. |
| Implementation | In this stage the individual employs the innovation to a varying degree |

| | |
|---|---|
| | depending on the situation. During this stage the individual determines the usefulness of the innovation and may search for further information about it. |
| Confirmation | In this stage the individual finalizes his/her decision to continue using the innovation. This stage is both intrapersonal (may cause cognitive dissonance) and interpersonal, confirmation the group has made the right decision. |

Roger's diffusion of innovation theory has been used since the 1960s to study a variety of innovations, ranging from agricultural tools to organizational innovation. The decades old assumptions of diffusion theory are still a fundamental for a diversity of research in the changing ICT environment.

Rogers' diffusion theory remains a central basis for much research effort in ICT innovation and adoption as its terminology (innovators, early adopters, laggards etc.) and assumptions (segment sizes, segment profiles, adoption determinants) still provide a popular framework in media and communication studies. For instance Moore and Benbasat (1991) used diffusion of innovation to develop "an instrument designed to measure the various perceptions that an individual may have of adopting an information technology (IT) innovation."

To the contrary Lieven De Marez, Tom Evens and Jeroen Stragier (2011), in their analysis of the diffusion theory in light of today's ICT environment, questioned if the major assumptions of the theory holds true in today's fast-evolving ICT-centric society. Finally the authors concluded saying that, "…*we can confirm that diffusion theory is still a valuable framework for research on media and information technologies*"

# CHAPTER THREE: RESEARCH METHODLOGY

Various scholars define methodology in a way that can fit to their field of study. Methodology refers to ways or mechanism of gathering, organizing and analyzing data (Polit & Hungler, 2004). Henning (2004) also defined methodology, as the logical groups of methods that harmonize one another and that have the ability to fit to deliver data and findings that will reveal the research questions and go with the research purpose. This chapter provides highlights of the research methods used in the study. It is structured around research design and methods, data sources, sampling technique and procedures, data collection tools, and data organization and analysis. Validity and reliability of data collection are also worth discussing in this chapter.

## 3.1.Research Design and Methods

Seeing that the study examined Farmers Use of Information and Communication Technologies (ICT) to get access to agricultural and market Information and to find answers to the research questions, the researcher used both quantitative and qualitative methods in combination.

Yauch and Steudle, 2003, cited in (Choy 2014), described Qualitative methods as the range of data collection and analysis techniques that use purposive sampling and structured, open-ended and interviews that allow the participants to raise issues that matter to them. The strength of qualitative methods is its ability to probe for underlying values, beliefs and assumption (ibid).

However, a qualitative method has its own drawbacks in every field of research methods. The major problem with qualitative methods is that first it is highly time consuming during interviewing and requires skillful interviewers (ibid).

Unlike the qualitative methods, quantitative method is known for its quick administration and evaluation (without taking longer time), its response can be tabulated within short period of time,

and the numerical data obtained through quantitative methods can facilitate comparison between groups (ibid). Nevertheless, quantitative method has also its own weakness in that it doesn't tell us why things have happened or the characteristics between poor and rich, perceptions and beliefs (Ibid).

Stokes (2003), emphasized the benefit of combining both methods saying, "....by conducting two or more methods of research, you can often achieve a more textured understanding of your object of analysis". Creswell (1994) picks this approach to articulate how people make sense of their lives and experiences with regard to the ICT. Moreover, Flick, quoted in Feyissa Girma (2011), explained that the different methodological viewpoints match each other as the balancing reward of the weaknesses and blind spots of each single design.

Descriptive statistics were used to analyze the quantitative data. Several scholars including Collis & Hussey, (2003) signified the importance of descriptive research design "Descriptive research can be used to identify and classify the elements or characteristics of the subject, e.g. number of days lost because of industrial action. Quantitative techniques are most often used to collect, analyse and summarise data". Moreover Merriam (1998) elaborates implementation of descriptive research as "....Descriptive research is undertaken when description and explanation of a phenomenon are needed and not a prediction based on cause and effect". Therefore the researcher used descriptive research to analyze and describe quantitative data which include use of frequencies, percentages, tables and charts in getting the report on farmers' use of ICT to get access to agricultural and market information.

### 3.2.Data Sources

According to the Population and Housing census (CSA, 2007), Limmu Kosa woreda has a total population of 161, 389. It constitutes 40 rural Kebeles and 4 town administrations that all surround the main town of Limu Genet. This area is mainly known for its coffee production, a major cash crop in the area. The researcher selected two kebeles namely Debelo and Dangaja which are known for their high production of coffee. According to the data sources from the woreda agriculture office, Debelo and Gangaja have total households of 485 and 443 respectively.

The researcher collected primary data from smallholder farmers, Officials from Limu Kosa Woreda Agricultural bureau and development agents. Observation was also used as part of the primary source as the researcher was observing the situations such as electronic boards in the town, network coverage and availability of electricity in the town of Limu Genet and the surroundings, while conducting the research. Moreover, various documents from Woreda agricultural office, reports from Worefda, records of DAs and lists of coffee and other cash crop producers in the woreda were used as secondary data sources.

### 3.3.Sampling Techniques and Procedure

The study focused on small holder farmers producing coffee and other cash crops in Limu Kosa woreda of Jimma Zone. The sampling unit for quantitative data was small holder farmers in both Debelo and Dangaja kebeles**.** Sample size is the pivotal feature that governs the overall design of the study; an appropriate sample size had to be determined using scientifically accepted approaches. A multi-stage sampling was employed in this study to select the respondents. Out of 40 rural kebeles of the woreda, two villages namely Debelo and Dangaja were purposively selected, using purposive sampling, based on their high production of coffee and other cash

crops. Also within the kebeles, households were stratified into members of union/cooperative and non-members. Several scholars like Burnard (2006), emphasize stratified sampling “You might divide the population into men and women, or into rural and urban sub frames—or into key age groups or key income groups and take a random sample from each of those groups”.

There were 127 small holder framers who were not members of the Cooperatives/Unions but high producers of coffee and other cash crops, while 115 smallholder farmers were members of the cooperative/unions in both kebeles. Of both strata groups, 42 respondents from non-members of cooperatives/unions and 38 from members of cooperative/union were selected for the study using systematic random sampling method whereby the number of sample respondents were divided by the number of total population in the strata groups in order to determine the sampling interval.

Woreda level lists/rosters of households who are members and non members of the union/cooperative were used as a sampling frame for selection of respondents for the stratified groups based on the sampling size allocated.

Purposive sampling method was employed for the qualitative data to select respondents who can provide the researcher with in-depth and relevant information linked to farmers and their agricultural input and output. Hence the researcher selected one woreda agricultural expert, one market promotion expert and one development agent and conducted in-depth interview.

### 3.4.Data Collection Tools

Various data collection tools were employed to obtain accurate and reliable information. The data collection tools included Questionnaires, Interviews and Document analysis.

### 3.4.1. Questionnaires

The researcher prepared questionnaires based on the literature review which contained both open ended and close ended questions which basically examined farmers' use of ICT, their knowledge and attitudes towards ICT, its challenges and opportunities from the smallholder farmers' perspectives.

The questionnaires were translated into Afan oromo for clarity and distributed to a total of 80 smallholder farmers through trained data enumerators. A great care was taken to collect accurate, valid and quality information that free from bias, illogical and incoherence. Since the data was collected by trained data collectors, with least diploma holders, who interviewed the selected small holder farmers and filled the questionnaires, all the distributed questionnaires were properly filled out and returned to the researcher.

### 3.4.2. Interview

In-depth interview was conducted with Limu kosa woreda agricultural officer, Market promotion expert and Development agents using semi structured interview guides. The in-depth interview used to gather qualitative information on farmers' use of ICT to get access to agricultural and market information.

In-depth interview was conducted using an interview guides with all experts, Agriculture, Market and Development Agents, to get in-depth and exhaustive information on the knowledge, attitude, challenges and opportunities they have towards ICT in the agricultural and market information. The interview guide was translated into local language (Afan Oromo) for the convenience and to make the respondents feel free and comfortable to understand and answer the questions. While a

short note had been taken during the interview, tape recording of the conversation was also employed.

### 3.4.3. Documents Review/Analysis

Various documents were analyzed to get important information on the study. Woreda based available resources such as number of total population in the kebeles selected for the study, map of the woreda and list of kebeles in the woreda were collected from archives of the study site.

## 3.5. Validity and Reliability of the Tools

To maintain the validity of the tools, professional experts and the advisor reviewed the questionnaires before the data collection. Furthermore, the questionnaires were piloted on 4 small holder farmers, 2 from each stratum, and were avoided to take part in the main study. The pilot study proved that all the questionnaires designed were appropriate without any error and the researcher decided to conduct the main study using the tools.

Oral consent from the respondents was obtained; and they were clearly and precisely informed about the research purpose so that they will be able to provide as accurate and reliable information as possible for the questionnaires. Similarly, the in-depth interview was directly translated into English from the tape that was recorded in Afan Oromo. Moreover, cross checking of the translated data with tapes was conducted by the researcher during analysis of the data.

## 3.6.Methods of Data Organization and Analysis

As described in the above sections, the researcher used both quantitative and qualitative methods to gather the data. The quantitative data was properly coded, cleared and entered into SPSS version 20 and quantitatively analyzed using the same software. To eliminate data entry errors

and to ensure quality control, all data entered were cross-checked with the corresponding questions. Finally the quantitative data was analyzed using descriptive statistics such as percentage and mean. Tables were used to present the findings.

The qualitative data generated from the interview was transcribed and translated into English which was later segmented thematically and analyzed to answer the research questions. The qualitative data triangulate and supplemented the findings obtained using the quantitative data. “Through qualitative research we can analyze the various factors which motivate people to behave in a particular manner or which make people like or dislike a particular thing” (Kothari, 1990, p3).

# CHAPTER FOUR

## 4. DATA PRESENTATION AND ANALYISIS AND DISCUSSION OF THE FINDIGNS

The major objective of this study was to assess small holder farmers' use of ICT to get access to agricultural and market information. This chapter deals with the findings that the researcher comes across during the study based on the respondents response collected from the study area. These responses were carefully and systematically reviewed and analyzed using appropriate statistical packages

### 4.1.Description of the Study Area

The district of Limu Kosa is found at the 8°6'0" N and 36°57'0" E in Jima zone, Oromia Region. The total area of the district is 2880 square km and located 1773 meters above sea level. According to the Population and Housing census conducted in 2007, Limmu Kosa, has a total population of 161, 389 (CSA, 2007)

It is bordered on the south by Kersa Woreda, on the southwest by Mana, on the west by Goma, on the northwest by the Didessa River which separates it from the Ilulbabore zone, on the north by Limu Seka, on the northeast by the Gibe River which separates it from the West Shewa zone and the Southern Nations, Nationalities and Peoples Region, on the east by Sekoru Woreda and on the southeast by Tiro Afeta Woreda.

With regard to Climate, Limu Kosa Woreda is classified into Dega (10%), Woina-Dega (65%) and kola (25%) zones. Natural and manmade forests are available in the district.

Limu Kosa constitutes 40 rural Kebeles and 4 town administrations that all surround the main town of Limu Genet. This area is mainly known for its coffee production as a major cash crop in the area. The coffee in Limu is renowned for its good cup, sweet, spicy/winey flavor and

balanced body and acidity. It is one of the premium specialty coffees worldwide. That is the reason this study is focusing on assessing small holder farmer's access to agricultural extension and market information using ICT. (Figure 3)

Debelo and Dangaja Kebeles, where this study was conducted are found 20 km away from the Limu Genet on the main rough road. These two Kebeles were chosen for the study because of their high productivity of coffee and other perishable items like fruits and vegetables.

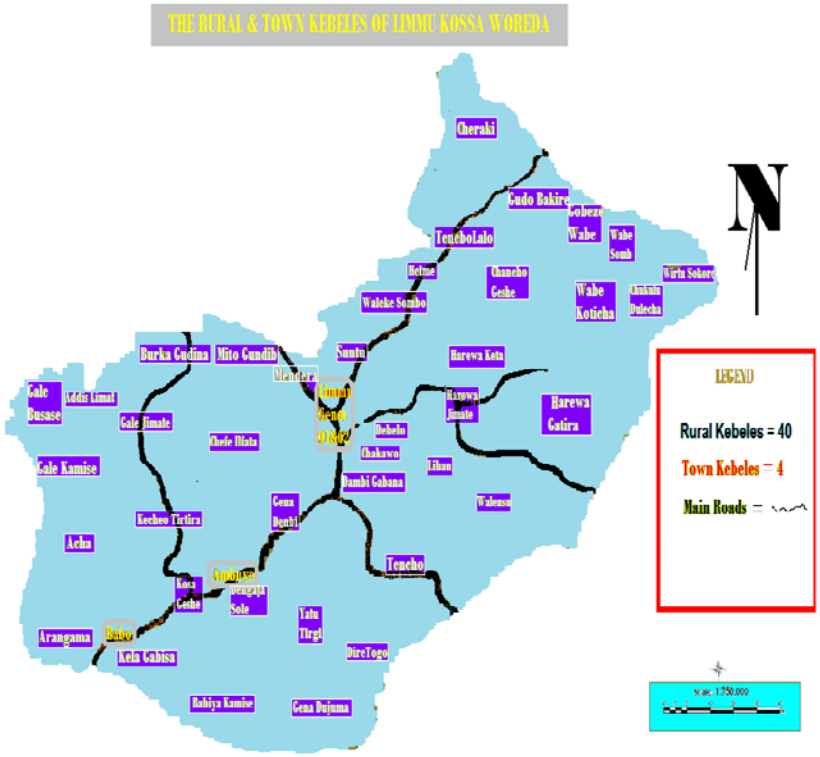


**Figure 3: Limu Kosa Woreda map**

### 4.2.Demographic Profile of Respondents

The following table shows demographics profile of sample respondents took part in the study. Their age, sex, education and marital status will be discussed below .

**Table 1:- Sex and Age of the respondents**

| **Sex** | **Frequency** | **Percentage** |
|---|---|---|
| Male | 63 | 78.8 |
| Female | 17 | 21.3 |
| Total | 80 | 100 |
| **Age** | **Frequency** | **Percentage** |
| 21-40 | 42 | 52.5 |
| 41-60 | 38 | 47.5 |
| Total | 80 | 100 |

Among the total of 80 respondents that took part on the study a little more than three-fourth of the respondents (78.8%) were men while women make 21.2% of the respondents. Looking at the age distribution respondents more than half (52.5%) of them are found between the age of 21-40 and the rest 47.5% of the respondents are between the age of 41-60 years.

**Table 2: Marital and educational Status of the Respondents**

| **Marital Status** | **Frequency** | **Percentage** |
|---|---|---|
| Un married | 7 | 8.8 |
| Married | 65 | 81.3 |
| Divorced | 5 | 6.3 |
| Widowed/Widow | 3 | 3.8 |
| Total | 80 | 100 |
| **Educational Status** | **Frequency** | **Percentage** |
| Non educated | 18 | 22.5 |
| Less than grade 8 | 46 | 57.5 |
| Grade 9-12 | 16 | 20.0 |
| Total | 80 | 100 |

As shown in the table above, the respondents' marital status shows that more than four-fifth (81.3%) of the respondents are married whereas 8.8% of them are unmarried. Moreover, 6.3% respondents are divorced while 3.8% of them are widowed.

With regard to their educational status, little less than a quarter (22.5%) of respondents has never been in school, while 57.5% claim to study until grade 8 or even less. Moreover, one fifth of the respondents reported to reach high school level education.

### 4.3.Total Cultivable Land & Main Cash Crop Grown in the Area

The data generated showed that out of total respondents taken part in the survey 60% owned less than one hectare of land while 40% them owned more than 2 hectare. All the respondents

practice irrigation. Those who irrigate less than one hectare are 97.5% where as only 2.5% of them irrigated more than 2 hectare of their land as can be seen in the following table.

**Table 3:- Total Irrigated Land of the Respondents**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | <1 hect | 78 | 97.5 |
| | 1-2 hect | 2 | 2.5 |
| | Total | 80 | 100.0 |

The majority of the respondents said that they either rented or owned the land they use for irrigation in both seasons -Meher and Belg.

Coffee was the main cash crop grown in the study areas as it is grown by more than three quarter (76.3%) of the respondents. Fruit and vegetables were grown only by less a quarter (23.8%) of the respondents who participated in the survey.

### 4.4.Access to Market

Respondents were asked to tell to whom they do sale what they produce. The table below shows the response of the farmers to whom they sale their produce.

**Table 4:- Respondents' Response as to Whom They Sale and Who Decide the Price of the Produce**

| To who they sale the produce? | Frequency | Percentage |
|---|---|---|
| Small traders in primary market | 42 | 52.5 |
| Middle traders | 6 | 7.5 |
| Cooperatives | 32 | 40.1 |
| Total | 80 | 100 |
| **Who Decide the Price?** | **Frequency** | **Percentage** |
| Small Traders | 17 | 21.3 |
| Cooperatives | 30 | 37.6 |
| Agricultural Office | 15 | 18.8 |
| Farmers self decision based on experience | 18 | 22.5 |
| Total | 80 | 100 |

As stated in the above table of the first raw, more than half (52.5%) of the respondents said that they sale what they produce to small traders in the primary market. When they deal in this type of market, 21.3 % of the respondents revealed that the small traders are the ones who set the price while 22.5% of them claimed to fix the price of their products based on previous market experience as can be seen in the second row of the table.

Nearly 40 % of the respondents claim to provide products for primary cooperatives in the area. The primary cooperatives in Limu Woreda Cooperatives collect coffee from individual farmers, process it further and submit it for the Oromia Coffee Farmers Cooperative Union (OCFCU). The cooperatives benefit the small holder farmers in two ways; upon selling their coffee for the cooperative, farmers are paid at the transaction time. Then, the farmers are entitled to have equal

share of the profit the cooperative makes after selling the collected coffee in the international market.

The cooperatives set up collection sites that enable them to buy coffee from farmers after assessing whether the coffee brought to them meet the required quality. Cooperatives decide the price they buy coffee from farmers based on market information they get from Limu Woreda Market and Promotion office. The Oromia Coffee Farmers Cooperative Union (OCFCU) currently sells Limu coffee in domestic and export markets in Europe, Japan and etc.

From the above table, we can conclude that market price is highly determined by the place and clients the farmers sale their agricultural products, whether cooperatives or small traders. Hence those small holder farmers who sale their products to the cooperatives get better price than those who sale it small traders in the primary market.

### 4.5.Access to Information

***Table 5:- Respondents' Main Sources of Agricultural Information***

| **Source of Information** | **Yes** | **No** | **Total** |
|---|---|---|---|
| Agricultural extension workers | 76.3% | 23.8% | 100 |
| Radio/TV | 71.3% | 28.8% | 100 |
| Mobile | 40% | 60% | 40 |

*As shown in the above table, the main sources of information for respondents to access agricultural information are Extension Workers. They* are rated as the main information sources by more than three quarter (76.3%) of the respondents. Radio & TV and Mobile phones are selected as information sources by 71.3 and 40 percent of respondents respectively.

From the table we can say that providing *access to information to farmers* helps them to increase their agricultural productivity and *put them in a favorable market position in relation to other actors.* Those farmers that access to accurate, timely and appropriate information are believed to make better decisions about what to produce, when to produce and where to sell than those who do not have such information. With regard to radio and television, based on Roger's Diffusion of innovation theory, the respondents have reached the stage of confirmation by continuing to use the technology for agricultural and market information.

The respondents do not have any access to Newspapers, journals, bulletins, posters and other written materials that carry agricultural information and messages.

***Table 6:- Source of Market Information***

| ***Source of information*** | ***Yes*** | ***No*** | ***Total Percentage*** |
|---|---|---|---|
| *Friends* | *42.5%* | *57.5%* | *100* |
| *Model Farmers* | *45%* | *55%* | *100* |
| *Agricultural extension workers* | *62.5%* | *37.5%* | *100* |
| *Members of Agricultural cooperatives* | *41.2%* | *58.8%* | *100* |
| *Radio/TV* | *75%* | *25%* | *100* |
| *Mobile* | *26.3%* | *73.8%* | *100* |
| *Electronic board* | *0* | *100%* | *100* |

The above table shows that when the respondents were asked where they get market information from, radio is the channel that is mentioned as a source of providing market information by three

quarter of the respondents (75%). And also information sharing among farmers using informal communication networks is a common practice in the area. Less than half, (42.5%), of the respondents claim to share agricultural information with their fellows. This is made easy through meetings in the villages such as in local beer and drinking and market places, churches, mosques and funeral gatherings. Agricultural extensions workers (62.5%), model farmers (45%), friends (42.5%) and member of agricultural cooperatives (41.2%) were cited in descending order by respondents.

Among the option given, the least communication channel chosen by respondents to access market information is Mobile phone technology (26.3%). *Strangely* enough, none of the respondents taking part in this study used electronic board of the Ethiopian Commodity Exchange (ECX) as a source of market information albeit its presence in nearby urban area. This is mainly due to illiteracy and absence or intermittent electricity in the town.

**Table 7:- Respondents' Frequency of Getting Market Information**

| | Frequency | Percentage |
|---|---|---|
| every day | 45 | 56.3 |
| every week | 22 | 27.5 |
| every month | 13 | 16.3 |
| Total | 80 | 100.0 |

*Therefore, we can conclude that, if farmers are to get* better prices for what they brought to the market, they need to get timely, accurate and proper market information. The electronic medium is not only the channel that provides market information to the respondents but they are also the preferred channels of communication to get access to market information.

In addition to the channels used to get access to market information respondents were required to tell the frequency they are seeking market information. The majority (56.3%) of the respondents said they can access market information every day; if they want to. The other 27.5 % of respondents consume market related information on weekly basis while only 16.3 % of them get once in a month.

According to Winrock (2003) Knowledge, communication and information exchange have influenced farmers decision on what to plant, when to plant, how to cultivate and harvest, where to store and where to sale and at what price. Therefore, this study identified that the vast majority of farmers can get agricultural and market information, although it's a one way or unidirectional. That means the majority get these information from radio, hence they are not able to ask back the day to day market price or the prediction of the next day agricultural information.

### 4.6.Types of ICT the Respondents Access to Get Agricultural and Market Information

There are different channels available for the transfer of knowledge to farmers. These days the trend is to seek any information, including agriculture, from multiplicity of ICT channels. To reap the benefits from the different ICT Channels, farmers need to be exposed and acquire the necessary knowledge and skill of managing and operating the different ICT channels. Opportunities are available for easy transfer of agricultural information from information generators to information users- in this case smallholder farmers.

**Table 8: Accessibility to ICT**

| ***ICT*** | ***Yes*** | ***No*** | ***Total*** |
|---|---|---|---|
| *Radio* | *96.3%* | *3.8%* | *100* |
| *TV* | *23.8%* | *76.3%* | *100* |

| | | | |
|---|---|---|---|
| *Computer* | *0%* | *100%* | *100* |
| *Mobile Phone* | *60%* | *40%* | *100* |

The result of the survey, above, revealed that, Radio is the communication channel that is accessed by almost all (96.3%) of the respondents. Mobile Phone is the second easily accessible channel as it is reached out by 60% of them. A little less than a quarter (23.8%) of the respondents receives access to Television transmission.

Computer based ICT technologies *are strange* to *all* the respondents taking part in the study. According to the development agent, one of the key informants taken place in the discussion, computer is not accessible for the development agents' themselves, let alone the farmers. He explained how difficult to get access to computer as follows

> *I had taken computer course in my college study, since I came here, although I was given one computer by the woreda, it has not been connected with woreda network due to absence of electricity and IT person who can connect it. I have now simply put it on desk. When some farmers come, they ask me what it is and I tell them that it is a computer and they ask me to open and show them how to operate. But since electricity is not here, how can I open and how them.*

According to Roger's stage of technological adoption process, knowledge plays an important role where by the individual is first exposed to an innovation but lacks information about the innovation (2003). In this case farmers have not been exposed to computer based ICT technologies and application such as e-mails and voice mails. Illiteracy and language problem are some of the cited barrier mentioned by the respondents to access information from modern ICT technologies by respondents.

The key informants acknowledged the effort done on the part of Ethio Telecom, the major ICT service provider in the country, to widen access to many ICT services and increase the number of subscribers. However, poor technological infrastructure that includes problems of connectivity and poor network coverage is also mentioned as a major stumbling block by key Informants. The informants explained that the achievements registered in creating access to telecom services are not accompanied by maintaining good quality services. They reiterated that though the expansion and optimization activities is done by the service provider and the number of subscribers has definitely increased, the telecom service has not registered a good performance in terms of quality.

Even when telecommunication infrastructure and networks are available, affordability makes access difficult for most of the respondents in Limu area. Personal computers, faxes, printers, Televisions and some ICT equipment are expensive and unaffordable to the majority of the respondents. Those who can afford these ICT equipments cannot easily access the benefits as there is no availability of electricity.

As far as Mobile phone is concerned 60% of the respondents said they access mobile phone and use the technology usually for personal use than accessing professional advice on agriculture and other related services. More than two-third (68.8%) of the respondents used mobile phone to negotiate price for their agricultural out puts directly with other market actors, while a little less than a third (31.3%) of them have never used mobile phone for the negotiation. None of the respondents used other ICT devices such as computers, landline phone, fax or internet for price negotiation.

Since the respondents do not use ICT equipments, the communications they have with agriculture extension workers, agronomists and agricultural researchers are oral and done mostly face to face or one on one basis.

One of the traditional *ICT* tools used by respondents to get agriculture information and professional advice on productivity is Radio. This is because the accessibility of Radio is by far better than any other communication medium in Limu area. It does not exclude those who are unable to read or write that makes it ideally suited to the uneducated *and less educated* coffee growing farmers. Its portability also contributed to create a culture of radio listenership in the area.

The other reasons mentioned by respondents to access Radio easily is its affordability and wide reception in the absence of electricity. These attributes make Radio the commonest of all the information and common technologies to be accessed in the area. However, respondents said that they find it hard to afford batteries on regular basis.

### 4.7. Attitude Towards the Use of ICT Devices and Applications

To measure how respondents feel towards ICT, a *5-point Likert scale* ranging from “Strongly Agree” on one end to “Strongly Disagree” on the other with “Neither Agree nor Disagree” ” in the middle is used in the questionnaire. In line with this, 10 attitudinal questions were included in the questionnaire. The following table shows attitudes of respondents based on the above lickers scale ranging.

**Table 9: Attitude Toward the Importance of ICT**

| ICT devices and Applications are: | Strongly agree | Agree | Neutral | Disagree | Strongly disagree | Total percentag |
|---|---|---|---|---|---|---|
| Easily accessible by farmers | 10 | 22.5 | 23.8 | 21.3 | 22.5 | 100 |
| Easier for farmers to learn how to use | 3.8 | 27.5 | 20.0 | 37.5 | 11.3 | 100 |
| Are easy for farmers to use and operate | 6.3 | 23.8 | 20.0 | 32.5 | 17.5 | 100 |
| Valuable information source for farmers | 31.3 | 58.8 | 10 | 0 | 0 | 100 |
| Enhance agricultural productivity | 37.5 | 51.3 | 10 | 0 | 0 | 100 |
| Improves the quality of service offered to farmers | 37.5 | 48.8 | 13.8 | 0 | 0 | 100 |
| Enable farmers to get correct and updated agricultural and market information | 45.3 | 37.3 | 17.5 | 0 | 0 | 100 |
| Improves farmers communication with agricultural extensions workers and input suppliers | 40 | 43.8 | 16.3 | 0 | 0 | 100 |
| Enable farmers to reach new market | 37.5 | 48.8 | 13.8 | 0 | 0 | 100 |
| Increase farmers profitability | 43.0 | 37.0 | 16.0 | 4.0 | 0 | 100 |

Among the respondents, only about one- third (32.5%) of them strongly agreed or agreed to the statement that farmers can easily access ICT devices and applications, whereas around 44 % of the respondents replied negatively either by strongly disagreeing or disagreeing to the claim. A little less than a quarter of respondents prefer to stay neutral.

Similarly, respondents were asked whether they think that ICT devices and applications are easy for farmers to use and operate. Nearly 31% of respondents have the opinion that farmers can use and operate ICT devices so easily without facing any difficulty. Conversely, almost half of the

respondents (49%) think that ICT devices are a bit tricky for farmers to make the maximum use ICT can offer for farmers while 20 % remains neither agree nor disagree to the question.

From the list of attitudinal questions raised one of them asks if respondents consider ICT as a valuable information sources to farmers. Almost 90% of the respondents recognize the importance of using ICT devices and applications. Roughly *the same percentage of respondents* approved the role of ICT devices and applications in enhancing agricultural productivity to farmers. None of the respondents nullified the importance of ICT to farmers while 10 % of them took neutral position.

Therefore, the above beliefs of farmer that ICT enhance agricultural productivity can be aligned with the idea of Chapman and Slaymaker (2002), which says that ICT intervention that improves the livelihoods of poor rural families will likely have significant direct and indirect impacts on enhancing agricultural production, marketing and post-harvest activities – which in turn can further contribute to poverty reduction.

Respondents that strongly agree or agree with the assertion that using ICT devices and applications improves farmers' access to get correct and updated market information are 82.6 %. Rather than showing their disagreement, the rest 16 % of them opt not to side. Significant of *portion (86.3%), summing strongly agree and agree*, the respondents also think that using ICT devices and applications enables farmers to reach new markets. Those who said using ICT devices and applications increases farmers' profitability are *nearly 80% of the respondents. To the contrary 4 % of them responded in a negative way, when the rest 16 % of them remain silent or were not sure about the impact of ICT device and application on farmers productivity.*

*The other attitudinal question raised in the questionnaire was incase respondents think that* using ICT devices and applications improves the quality of services offered to farmers. Around

87 % of them held the view that the use of ICT devices and applications certainly improve the quality of agricultural services provided to farmers. Correspondingly, they claim that using ICT devices and applications improve farmers' communication with agriculture extension workers, input suppliers, customers, and other trading partners is approved by 84 % of the respondents. This can be supported by Roger's stages of technological adoption process of decision whereby the individual takes the concept of the change and weighs the advantages of using the innovation (in this case the ICT) and decides to adopt It (2003).

### 4.8. Factors Affecting the uptake of ICT devices by farmer

The study came up with many factors that adversely affect the adoption of ICT devices and applications. *Among the factors that hinder ICT adoption by farmers the one that mentioned* repeatedly by most respondents was lack of technological infrastructure (both telecommunication and Electricity) and disruption of networks.

The following table shows factors affecting the respondents from adopting ICT technology

**Table 10: Factors Affecting ICT Adoption**

| **Factors** | **Yes** | **No** | **Total** |
|---|---|---|---|
| Network Disruption | 92.5% | 7.5% | 100 |
| Absence of Electricity | 95% | 5% | 100 |

More than 95% of the respondents maintained that lack of technological infrastructure and fragile or absence of electricity are one of the determining factors. Almost equal proportion of the respondents (92.5%) also mentioned disruption of networks was mentioned as the main

bottleneck for uptake of ICT adoption by farmers in the study area. An In-depth interview conducted with key informants confirmed this finding. According to key informants, network failure and low connectivity was the major hurdle that holds back farmers from using modern ICT technologies such as mobile telephony. Limu Kosa woreda market promotion expert explains the difficulty of technological infrastructure as follows:

> *In the first place, producers should obtain market and agricultural information on the product they produce. But such kind of awareness has not been provided to small holder farmers. They don't have a chance to use modern communication technology such as mobile and internet. The reason farmers are not using this technology is mainly due to lack of infrastructure such as network and electricity. Most of the time network is not working in this area hence you can't use mobile phone. You get electricity once or twice in a month; hence people don't have the means to charge their mobile phone. Let alone for farmers, we face difficulties in getting connected with the DAs in the village to disseminate information.*

Moreover, the technological devices supposed to disseminate information to the farmers, which are already there, are not functioning due to absence of electric power. This can be visualized by the electronic board posted in the town of Limu by ECX, which was not functioning by the time this data was collected. The picture below, figure 4, was taken during the data collection.


**Figure 4: electronic board posted in the town of Limu**

According to the woreda development agents, one of the key informants, electronic board has never been used to disseminate market information for farmers. He explained the situation as follows:

> *When we first see the board in the town, we thought it was posted to broadcast football game as is the case in some DSTV rooms. Later on when coffee prices started to be displayed, we realized that it is price information board. This is because no one has been trained on what it is about and how to operate. How do we expect farmers to read and understand market price from this board when we are not even aware of it.*

Key Informants think that they are denied their right of getting quality services because Ethio telecom abuses its monopoly position and failed to expand the network coverage or improve the quality. Had there been competition in the sector, the company would have strived to give quality services. It is almost impossible to get network and get connected through mobile phones when there is power disruption, which is also a common incidnet in Limu area.

**Table 11:- Factors/Barriers affect the usage of ICT device.**

| **Barriers** | **Yes** | **No** | **Don't know** | **Total percentage** |
|---|---|---|---|---|
| Literacy | 85% | 10% | 5% | 100 |
| Language | 77.5% | 15% | 7.5% | 100 |
| Lack of basic ICT skills | 78.8% | 12.5% | 8.8% | 100 |
| ICT device and applications are too expensive | 62.5% | 30% | 7.5% | 100 |

Factors such as illiteracy and lack of basic ICT skills were also mentioned by significant proportions of respondents. When illiteracy was stated as a problem by 85 % of the respondents, those who mentioned lack of basic ICT skills as a barrier stand at 78.8%. The discussions held with Key informants also pointed out that the slower adoption of ICT by the coffee grower farmers in Limu area is attributed as a result of illiteracy and lack of basic ICT skills. As the coffee growers in Limu area remain illiterate *or* semi-literate and unskilled in computer usage, their level of ICT adoption stay lower. The woreda Agricultural expert re-iterate the difficulty of understanding the ICT posted for information dissemination in the town as follows

> *Electronic board posted here is supposed to be one of the mechanisms to disseminate information to the farmers in the surrounding. However, due to the fact that the*

*information, when available, is being displayed in Amharic and the majority of the farmers are not able to read and understand the language. Therefore, instead of feeling the board as source of information, they take it as a film board. Hence illiteracy and language barriers are one of the major factors that affect the farmers from getting timely and accurate information.*

*Since most of the ICT applications and information on the World Wide Web are available in* dominant *foreign languages (English, French and Chinese), whereby local people are unable to operate easily, language is pointed out as a barrier* for *ICT adoption. Out of the total respondents taking part in the study, 77.5 % of them said language is a difficulty. This is mainly because Afan Oromo and Amharic* languages mainly spoken by Coffee growing farmers are absent or not widely used in modern ICT technologies such as the Internet.

*From the factors the one* relegated to *the least as barrier, but significant in its own right in terms of percentage, is the costliness of* ICT devices and applications. Just about two-third (62.5%) of the respondents said ICT devices and applications are expensive, while the other 30 % said price won't affect ICT adoption by coffee grower farmers in the area. In relation to price, key informants stated that over charging of phone calls and text messages by Ethio Telecom are also mentioned as a difficulty.

# CHAPTER FIVE: CONCLUSSIONS AND RECOMENDATIONS

This study assessed Farmers Use of ICT to get access to agricultural and market information in Limu Kosa woreda of Jima Zone. This part presents conclusions and recommendations of the study.

## 5.1. CONCLUSSIONS

The study aimed at assessing and analyzing how small-holder farmers of Limu Genet Woreda use ICTs to get agriculture and market related information. It mainly focused on identifying major ICTs farmers were using, their attitudes towards the ICT and challenges that hinder them from adopting the technologies.

Both qualitative and quantitative methods were employed to get the information. Questionnaires, in-depth and key informants' interview guides were applied as data collection instrument. The quantitative data were coded and entered into SPSS version 20 for analysis, while the qualitative data were transcribed and translated from Afan Oromo back to English and thematically categorized and used in the study. Descriptive research design was used for the analysis and description of quantitative data using percentages, tables and frequencies.

The result of the study revealed that most of the respondents (97.5%) possessed less than one hectare of land in the study area.

Most of the famers sold their produce to small traders in primary market (52.5%) and cooperative. As the cooperative decide the price of the crops, those who sold their agricultural out puts to cooperatives were getting better price than those who sold to small traders.

Agricultural extension workers or DAs were served as the main source of agriculture information (76.5%) followed by radio (71.3%) and Mobile phone (40%). Also radio was the main source of

market information (75%) followed by Agricultural extension workers (62.5%), model farmers (45%), friends at different meeting and local drinking places (42.5%) and members of agricultural cooperatives (41.2%) in their respective order. Mobile was mentioned as the least used source of market information (26.3%) in the study area.

Mobile was most commonly used by farmers for ordinary communication than for market information (60).

Few had access to television (23.8%) and computer based ICTs were remote to access to farmers in the study area.

With regard to attitudes toward using ICT technologies, there was a feeling among farmers that ICT devices are not easily accessible, difficult to operate and expensive to afford. Despite these negative thought, most farmers believe that ICT devices could enhance agricultural productivity and improves quality of services offered to farmers by providing updated and relevant agricultural and market information.

Unfortunately, the uptake of ICT devices by farmers was hindered by lack of technological infrastructure (both telecom network and electricity) such as repeated disruption of electricity and unavailability of network in the study area.

Some technological devices such as electronic board posted in the town of Limu Genet couldn't provide market information to the farmers due to lack or intermittent electricity in the town.

In addition, barriers related to literacy, language, lack of basic ICT skills, and cost of ICT devices were identified as the major uphill hurdles to use ICT devices to secure agriculture and market information in the study area.

## 5.2. RECOMMENDATIONS

Based on the conclusion of the findings, the researcher has forwarded the following recommendations.

- Providing *access to information* help *farmers* to increase their agricultural productivity and *put them in a favorable market position in relation to other actors. Hence primary sources of information such as agricultural extension workers should be updated with agricultural and market information, how to collect and disseminate accurate and timely information to the farmers. This could be done through upgrading their skill or on job training by agricultural offices or other bodies working on agriculture and market information dissemination.*
- *As most farmers who are selling their produce to cooperatives in primary market get more price benefit than those who sale to small traders, the cooperatives should attract and bring them to the membership through price incentives.*
- *There should be a coordinated way of improving* technological infrastructure (both telecommunication network and Electricity) between Ethio telecom and Electric power corporation in order to solve network and power disruption so that farmer can adopt and get access to the ICT.
- Orientation on how to get information from the existing electronic devices such as Electronic board posted by ECX in the town should be given to woreda agricultural Office, market promotion experts and DAs.
- Although most farmers know that ICT adoption could enhance their agricultural productivity and improves quality of market price, they are afraid that they don't know

how to operate and make use of it. Hence, adult literacy given by the government in each village should also focus on proving basic operation and usage skills to the farmers.

**BIBILIOGRAPHY**


Alberts, D. and Papp, D. (eds) (1997). The *Information Age: An Anthology on its Impact and Consequences*, Washington, DC: National Defense University Press.

Belay Kassa (2003). Agricultural Extension in Ethiopia: the case of participatory demonstration and' training extension system Journal of Social Development in Africa Vol 18 No 1 JANUARY 2003.

BCO (2008). Impact Assessment Study; The final report accessible at http://www.bcoalliance.org/system/files/BCO_Final-Report.pdf

Berhanu, Gebermedehin D. Hoekstra and Azage Tegegne,(2006). *Commercialization of Ethiopian agriculture: extension service from input supplier to knowledge broker and facilitator,*Improving Productivity and Market Success(IPMS) of Ethiopian farmers project, ILRI (International Livestock Research Institute) Working Paper No. 1

Bernard, H. Russell (2006). Research Methods in Anthropology, Qualitative and Quantitative Approaches, 5th ed

Bolarinwa, K. and Oyeyinka, R. (2011). *Use of Phones by farmers and its implication on farmers' production capacity in Oyo State, Nigeria.* World Acadamy of Science, Engineerign and techenology (vol 75).

CECCHINI, S. & SCOTT, C. (2003). Can information and communications technology applications contribute to poverty reduction? Lessons from rural India. *Inf. Technol. Dev.*, 10**,** 73-84

Central Statistics Agency (CSA) (2007). Accessible at http://www.csa.gov.et

Chandler, D (1994). Technological or Media Determinism, accessible at **www.ucalgary.ca/~pfitzger/determin.**pdf

Chapman, R. and Slaymaker, T. (2002). ICTs and Rural Development: Review of the Literature, Current Interventions, and Opportunities for Action. ODI Working Paper 192. London: Overseas Development Institute

Churi, A etal. (November 2012). Understanding Farmers Information Communication Strategies for manageing Climate Risk in Rural Semi-Arid Areas. *Tanzania International Journal of Information and Communication Technology Research Vol 2, No.11* .

Collis, J. & Hussey, R. (2003). Business Research: a practical guide for undergraduate and postgraduate students, second edition. Basingstoke: Palgrave Macmillan.

Creswell J.W. (1994). Research Design: Qualitative and Quantitative Approaches, Thousand Oaks, California.

Dereje Tilahun (2011). *The effectiveness of Marketing Communication Chaneels: The cae of ethiopia Commodity Exchange.* Addis Ababa University.

Dhameja & Uma Medury (2005). Information and Communication Technology in the Globalization Era: The Socio-economic Concerns accessible at http://unpan1.un.org/intradoc/groups/public/documents/eropa/unpan014261.pdf

Dutta, S. & Bilbao-Osorio, B. (eds), (2012). The Global Information Technology Report 2012: Living in a Hyper-connected World: Insight Report

Federal Ministry of Information (2001). *Rural Development Policies, Strategies and Tactics, Addis Ababa (Amharic Version).*

Feyisa Girma (2011). *New Media As a source of foreign News in Oromia Mass Media Organization, challanges and opportunities.* Addis Ababa University.

Gurumurthy, A. (2004). *Gender and ICT: Overview Report.* BRIDGE Publications.

Heidinger, Kurt (2011). Technological Determinism What it is? Accessible at http://biocitizen.org/technological-determinism-what-it-is-what-we-can-do-about-it

Henning, E. Van Rensburg, W. & Smit B. (2004). Finding your way in Qualitative Research. Van Schaik: Pretoria

IICD (2006). ICTs for Agricultural livelihood; Impact and Lessons learned from IICD Supported activities.

ITU (2004). ICTs As enablers of Development: A Microsoft White Papers

ITU (2002). *Internet from the Horn of Africa: Ethiopia Case Study; Geneva, Switzerland.*

Jorge, S. (2002). The economics of ICT: challenges and practical strategies of ICT use for women's economic empowerment. *Proceedings of the Expert group meeting on "Information communication technologies and their impact on and use as an instrument for the advancement and empowerment of women"*. Seoul, Korea, 11- 14 November 2002.

Kothari, C.R. (1990). Research Methodology; Methods and Techniques, 2nd edd., New Age International Publisher

Lie, R. (2012). Background Paper: ICTs for Agricultural Development. An Exercise in Interdisciplinary Wageningen University

Lieven De Marez, Tom Evens and Jeroen Stragier (2011). Diffusion theory vs. today's ICT environment Observatories', (OBS*) Journal, Vol.5 – No 3, 175-202

Looi Theam Choy, (2014). The strengths and Weaknesses of Research Methodology: Comparison and Complementary between Qualitative and Quantitative Approach. *IOSR Journal Of Humanities And Social Science (IOSR-JHSS) Volume 19, Issue 4, Ver. III (Apr. 2014), PP 99-104 e-ISSN: 2279-0837, p-ISSN: 2279-0845, University of Malaysia*

McNamara, Cory Belden, Tim Kelly, Eija Pehu and Kevin Donovan (2012). Overview of ICT in Agriculture: Opportunities, Access, and Cross-Cutting Themes Module I, World Bank.

Meena & Singh (2008). ICT Enabled Extension in Agriculture Sector: Opportunities & Challenges in Climate Change Situation.

Merriam, S.B. (1998). Case study research in education: A qualitative approach. London: Jossey-Bass Publishers.

MOFED (2010). *Growth and Transformation Plan.*

Moore, G. C. and I. Benbasat (1991). Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation, Information Systems Research (2)3, pp. 192–222.

Mulat Demeke (2002). Agriculture Development Led Industralization (ADLI) and Poverty reduction in Ethiopia: Some Observation on Application of the Strategy. AAU, Department of Economics (unpublished).

Neil, M. (2002). Encyclopedia of-the-History-of-Technology

OECD (2005). Good Practice Paper on ICT for Economic Growth & Poverty Reduaction. The DAC Journal, Vol 6, No 3

Panos London Illuminating Voices (2007). ICT and Development in Zambia; Challenges and Opportunities. Accessible at www.ngopulse.org/files/Zambia_Research_Report.pdf

Polit, D. and Hungler, B. (2004). Nursing Research, Principles and Methods

Purnomo, S. & Lee, Y. (2010). An Assessemnt of Readiness and barriers Towards ICT Program Implementation:Perception of Agricultural Extension Officer in Indonesia. *International Journal of Education and Development Using information and Communication Technology (IJEDICT, Vol 6, Issue 3, PP 19-36* .

Reddi, Usha Vyasulu (2012). the role of ICT in Education and development; potentials, pitfalls and challenges,
Accessible at http://www.unesco.org/education/aladin/paldin/pdf/course01/unit_13.pdf

Richardson, D. (2005). How can agricultural extension best harness ICTs to improve rural livelihoods in developing countries? In Geld, E. & Offer, A. (eds): ICT in agriculture: Perspectives of technological innovation. Jerusalem: EFITA.

Rogers, E. (2003). *Diffusion of Innovations (5th edition).* New York, NY: The free press.

Rogers, E.M. (1995). *Diffusion of innovations (4th edition).* The Free Press. New York

Siraj, Mahrukh (2013). A Model for ICT Based Services for Agriculture Extension in Pakistan

Snyman, M. & Snyman, R. (2003). Getting information to disadvantaged rural communities: The centre approach. *South African Journal of Libraries and Information Science*, 69(2): 95-107.

Stien, J. (2007). *How ICT can make a diference in agricultural livelihoods:The commonwealth Miniters Reference Book:International Inistitute of Communication and Development (IICD).* Retrieved from http://www.iicd.org/files/ICT%20agricultural%20livelihoos.pdf

Stokes, J. (2003). How to do media & cultural studies, SAGE Publications, London

Swiss Agency for Development Cooperation (2007). Deepening Participation and Improving Aid Effectiveness through Media and ICTs

Tsega Tadesse (2010). *Ethiopian Commodity exchange (ECX)- Connectign farmers to the market.* Swidish Business School, Sweden: Orberto University.

UNDP (2012). *Promoting ICT based agricultural knowledge management: To increase production and productivity os smallholder farmers in ethiopia; Development Brief No 3.*

UNDP (2001). Information Communications Technology for Development: Essentials, Synthesis of Lessons Learned, Evaluation Office

USAID (2011). *ICT to Enhance Farm Extension Services in Africa: Brifeing Papaer.*

Wilson, M. (2002). Understanding the International ICT and Development Discourse: Assumptions and implications; Journal of Africa Information and Communications, afjic_Vo 3_No 6.pdf

Wolfert, S & Kempenaar, C. (2012). The role of ICT for Future Agriculture and the role of Agriculture for Future ICT Wageningen University Plant Research International

Woodburn, et al. (1994). Computer use and factors influencing computer adoption among commercial farmers in Natal Province, South Africa. Computers and Electronics in agriculture.

Worku Bogale (2005). A Background Paper on Telecom & Telecom Statistics in Ethiopia

World Bank (2012). Making ICT Infrastructure, Applications and Service More Accessible and Affordable in rural Area, Module 2.

# APPENDICES

## Annex I

## Questionnaires for small holder farmers

Dear respondents,

This questionnaire is prepared to collect data with regard to Small holder farmers' use of modern Information and communication Technologies to get access to agriculture information. It will provide a major input for my thesis and it is purely conducted for academic purposes.

Therefore, you are kindly requested to provide your valid responses to the sets of the questions included in the questionnaires. All your responses remain confidential.

We thank you in advance for your cooperation.

**Section I- General Information**

Woreda/District _____

Kebele_____

Questionnaire of Interview

**Section II- Respondent Information**

1. Sex Male ☐ Female ☐
2. Which of the following categories best describes your age?
   1. Bellow 20 2. 21 – 40 3. 41 – 60 4. 61 -80 5. Above 80
3. Educational level 1. No formal education 2. grade $8^{th}$ or less
   3. $9^{th}$ to $12^{th}$ grade 4. Certificate 5. Diploma
   6. BA Degree 7 above BA Degree
4. Marital status 1. Not married ☐ 2. Married ☐ 3. Divorced ☐ 4.Widowed ☐
5. Total Land holdings of your household----------(Hectare)
6. Total irrigated land you own? _____(hts)

7. Total land you sharecropped-in/rented in the last cropping season?_____(hts)
8. Total land your household cultivated in the last cropping season (Meher and Belg):_____

   1. Meher_____ (hts)  2. Belg_____ (hts)

9. How many Km/hours you walk from nearest market?_____
10. What type of cash crop do you produce? 1. Coffee ☐ 2. Vegetable ☐
    Other (specify)_____
11. Where do you sale your coffee/vegetables? _____
12. To whom do you sale your coffee/vegetable?
    a. Small traders in primary market b. Middle traders c. Cooperatives D. Unions
13. Who decide the price of your coffee/vegetables?

    1 Small traders  2. Cooperatives  3. Unions

    4. Agriculture office  5. Ourselves based on negotiation and existing price

14. Are you a member of any farmers union or Cooperative?
    1. Yes  2. No
15. If your answer to question "14" is no, why?

    _____

    _____

    _____
16. If you are a member of the farmer's cooperative, how often do you receive market information?_____

**Section III. Questions Related to Access Information**

17. From where do you get information regarding agricultural extension information that help you to increase productivity? (multiple answer is possible)
    1 Friends at meeting/local drinking place
    2 From Model Farmers
    3 From agriculture extension workers
    4 From media (radio, TV)

5 From modern technology (Mobile, Internet)

6 If from other source, please specify _____

18. Which one of this is your preferred source to get agriculture related extension information
    1. Friends at meeting/local drinking place
    2. From Model Farmers
    3. From agriculture extension workers
    4. From media (radio, TV)
    5. From modern technology (Mobile, Internet)
    6. If from other source specify
19. Where do you get market information? (multiple answers can be possible)
    1. Friends at meeting/local drinking place
    2. From Model Farmers
    3. From agriculture extension workers
    4. From agricultural cooperative from where you are a member
    5. From media (radio, TV)
    6. From modern technology (Mobile, Internet)
    7. From electronic board posted in the town
20. Which one of this is your preferred source to get market related information
    1. Friends at meeting/local drinking place
    2. From Model Farmers
    3. From agriculture extension workers
    4. From media (radio, TV)
    5. From modern technology (Mobile, Internet)
    6. If from other source specify
21. How often do you get market information?
    1. Everyday 2. Every week 3. Every month 4. Others Specify_____
22. Do you think you get market information on time?
    1. Yes 2. No

**Section IV. Knowledge, Access & Use of ICT**

23. From, the ICT devices listed hereunder with which of the following are you familiar?

    1. Radio 2. TV 3. Desk Top Computer/Lap Top 4. Mobile Phone

    5. Landline Phone 6. Fax Machine 7. Other Specify_____

24. From, the ICT applications listed under with which of the following are you familiar with

    1. Internet 2. E-mail 3. Word Processing 4. Voice mail application

    5. Text message 6. Interactive Voice Radio

    7. Other Specify_____

25. Do you have an easy access to the use of the Information communication Technology devices listed under? (thick their response and multiple answer is possible)

| Devices | Response | |
|---|---|---|
| | Yes | NO |
| Radio | | |
| TV | | |
| Computer | | |
| Mobile phone | | |
| Landline phone | | |
| Computer with internet | | |
| Fax Machine | | |

26. Among these Information communication Technology devices which one do you own? (multiple answer is possible)

| Devices | Response | |
|---|---|---|
| | Yes | NO |

| | | |
|---|---|---|
| Radio | | |
| TV | | |
| Computer | | |
| Mobile phone | | |
| Landline phone | | |
| Computer with internet | | |
| Fax Machine | | |

27. How often are you using these ICT devices for general communication purpose eg. To communicate with friends, to get market information etc

| | 1. More than Once<br>2. Once a day<br>3. Once a week<br>4. Once a Month<br>5. Never used |
|---|---|
| Radio | |
| TV | |
| Computers | |
| Mobile Phone | |
| landline phone | |
| Computers with Internet Line | |
| Fax Machine | |
| Other Specify_____ | |

28. If you are using these services how much do you spend on average per month

| | 1. 25 birr |
|---|---|

| | |
|---|---|
| | 2. 50 birr<br>3. 100 birr<br>4. More than 100 birr<br>5. Never used |
| Internet & e-mail | |
| Mobile Phone & Text Message | |
| Other Specify_____ | |

**Section V. Use of ICT devices and applications to get agriculture information**

29. Have you ever used the following ICT devices to get agriculture information or professional advice on productivity? Multiple answer is possible

| Devices | Response | |
|---|---|---|
| | Yes | NO |
| Radio | | |
| TV | | |
| Computer | | |
| Mobile phone | | |
| Landline phone | | |
| Computer with internet | | |
| Fax Machine | | |

30. How frequently are you using these ICT devices you mentioned above (question 29)to get the following information?

| Type of information | Response | | | | |
|---|---|---|---|---|---|
| | More than once a | Once a day | Once a week | Once a month | Never used |

| | | | | | |
|---|---|---|---|---|---|
| | week | | | | |
| Agriculture related information or professional advice on productivity | | | | | |
| To communicate with agricultural extension workers | | | | | |

31. Have you ever used the following ICT applications to get agriculture information? Multiple answer is possible

| Applications | Response | |
|---|---|---|
| | Yes | NO |
| Internet | | |
| E-mail | | |
| Word Processing | | |
| Voice Mail | | |
| Text Message | | |
| IVR | | |

32. How frequently are you using these ICT applications to get agriculture related information

| Applications | 1.More than Once<br>2. Once a day<br>3. Once a week<br>4. Once a Month<br>5. Never used |
|---|---|
| Internet | |
| e-mail | |
| Word Processing | |

| | |
|---|---|
| Voice Mail | |
| Text Message | |

**Section VI. Use of ICT devices and applications to get agriculture Market information**

33. Have you ever used the following ICT devices to get agriculture related market information?

| Device | Response | |
|---|---|---|
| | Yes | NO |
| Radio | | |
| TV | | |
| Computer | | |
| Mobile phone | | |
| Landline phone | | |
| Commuter with internet connection | | |
| Fax machine | | |

34. How frequently are you using these ICT devices to get agricultural related market information. Multiple answer is possible

| Device | 1. More than Once<br>1. Once a day<br>2. Once a week<br>3. Once a Month<br>4. Never used |
|---|---|
| Radio | |
| TV | |

| | |
|---|---|
| Computers | |
| Mobile Phone | |
| landline phone | |
| Computers with Internet Line | |
| Fax Machine | |
| Other Specify | |

35. Is there a time that these ICT devices used to share market information with input (improved seed, fertilizer, pesticide) providers in your area?

| Device | Response | |
|---|---|---|
| | Yes | NO |
| Radio | | |
| TV | | |
| Computer | | |
| Mobile phone | | |
| Landline phone | | |
| Computer with internet connection | | |
| Electronic board | | |
| Fax machine | | |

36. Have you ever used these ICT devices you mentioned above (Q.35) to get the following information?

| Information | Response | |
|---|---|---|
| | Yes | NO |
| to share market information with agricultural cooperatives | | |

| | | |
|---|---|---|
| To receive market information from middle men | | |

37. Have you ever used these ICT devices to negotiate on the price & sell your produce directly to consumers?

| Devices | Response | |
|---|---|---|
| | Yes | NO |
| Computer | | |
| Mobile phone | | |
| Landline Phone | | |
| Computer with internet line | | |
| Fax Machine | | |

**Section VII. Attitude towards the Use of ICT devices and applications**

38. The following table describes your attitude towards the use of ICT devices and application:-

| | | 1. Strongly agree<br>2. Agree<br>3. Neutral<br>4. Disagree<br>5. Strongly disagree |
|---|---|---|
| | ICT devices and applications are easily accessible by farmers? | |
| | Learning how to use ICT devices and applications is easy for farmers? | |
| | Using ICT devices and applications is easy for farmers to use and operate? | |

| | | |
|---|---|---|
| | Using ICT devices and applications is scary for farmers? | |
| | ICT devices and applications are affordable to purchase by farmers? | |
| | ICT is valuable information sources to farmers | |
| | Using ICT devices and applications enhances agricultural productivity? | |
| | Using ICT devices and applications improves the quality of services offered to farmers? | |
| | Using ICT devices and applications improves farmers communication with agriculture extension workers, input suppliers, customers, and other trade partners | |
| | Using ICT devices and applications improves farmers' access to get correct and updated market information? | |
| | Using ICT devices and applications enables farmers to reach new markets | |
| | Using ICT devices and applications increases farmers profitability | |

**Section VIII. Factors that prevent uptake of ICT devices and applications**

39. Among the factors listed under which of them limited the use of ICT devices and applications by farmers?

| | 1. Yes<br>2. No<br>3. I do not know |
|---|---|
| Illiteracy | |
| Language Barrier | |
| Lack of basic ICT Skills | |
| ICT devices and applications are too expensive | |

| | |
|---|---|
| Lack of technological infrastructure | |
| Disruption of Networks | |
| Absence or disruption of electricity | |
| Do not understand the value of ICT | |
| Unperceived economic or other benefits of ICT | |
| Lack of skill upgrading training | |
| Other Specify_____ | |

40. If the problems mentioned in q 39 are solved, I am willing to adopt ICT devices and applications

| | 1. Yes<br>2. No<br>3. I do not know |
|---|---|
| Illiteracy | |
| Language Barrier | |
| Lack of basic ICT Skills | |
| ICT devices and applications are too expensive | |
| Lack of technological infrastructure | |
| Disruption of Networks | |
| Absence or disruption of electricity | |
| Do not understand the value of ICT | |
| Unperceived economic or other benefits of ICT | |
| Lack of skill upgrading training | |
| Other Specify_____ | |

## Annex II

**Gaaffii qotee bultoota/omshitootaf qophaa'e**

Kabajamoo,

Gaafilleen kun haala qotee bultooni ykn omishetooni odeefannoo gabaafi qonnaa ilaalchisee technolojii qunnamtii ammayaa akkamitti akka fayadaman qorannoo taasisuuf kan qopha'eedha.

Gaaffileen kun qorannoon ani taasissuf kan nagargaru yoo ta'u gutumaan guututi qorannoo qofaanf kan oluudha.

Kanaafuu gaaffilee armaan gaditti dhiayaatan kana deebii dhugaa ta'e akka nuuf kenitaniif kabajaan isin gaafachaa, deebiin keessan kam'iyuu icitidhaan kan qabamu ta'uu isaa misrkaneesuun barbaada.

Galatooma, amma gara graffiti ceena.

**Kutaa 1:- Gaaffii waliigalaa**

Anaa:_____

Ganda:_____

**Kutaa II:- Odeffannoo gaffii deebsitootaa**

41. Saala Dhiira ☐ Dhalaa ☐
42. Gaffilee armaan gadii keessaa isa kamtu umrii kee ibsa?

    2. Waggaa 20 gadi 2. Waggaa 21 – 40 3. Waggaa 41 – 60 4. Wagaa 61 -80 5.Waggaa 80 ol
43. Sadarkaa barumsaa 1. Barumsa idile hin qabu 2. Kutaa 8 fi isaa gadi

    3. Kutaa 9- 12 4. saratafikeetii 5. Dipilomaa

    6. Digrii Jalqabaa ykn BA 7 Digrii Jalqaba ol (above BA Degree)
44. Haala maatii 1. Hin fuune/hin heerumne ☐ 2. Kan fuudhe/heerumte ☐

    3. Kan hike/hiikte ☐ 4.Kan irraa du'e/duute ☐
45. Bay'ina lafa qonnaa walamumaagalati qabdu (hektaara meeqa)?----------
46. Lafa Jallisii hectaara meeqa qabda? _____(hts)
47. Bara Omisha darbee kana lafa hammam kireefate ykn qotte? (hektaaran)_____
48. Bara omishaa darbe kana lafa hammam qotate? (belgifi mehiri

irrati):_____

1. yeroo omisha gudda (meher) hektaara_____ 2. Yeroo belgii heektaara_____

49. Gabaa siti dhihoo jiru Kilomeetira meeqa si oofa (miilan)?_____

50. Omisha gurgurtaa/gabbaf oolu kam omishta?

1. Buna ☐ 2. Kuduraf fudura ☐ 3. Kan biroo (ibsi)_____

51. Buna ykn kuduraf fudura essati gurgurta? _____

52. Buna ykn kuduraf fudura enyutti gurgurta?

b. Daldaltoota xixiqqoo gabaa dhihoo jiran b. Daldaltoota gidu galeesati c. Kopireetiviiti D. Uniyeenitti

53. Gatii buna ykn kuduraaf fudura kee kan murteesu enyuu?

1 Daldaltoota xixiqqoo 2. kopireetivii 3. Uniyeenii

4. wajjira qonnaa 5. Numatu gatii jiru irrati hunda'ee murteesa

54. Ati miseensa Uniyeeni ykn koopireetivitii?

2. Eyyee 2. Miti

55. Yoo gaaffiin kee Lak "14" **Miti** kan jedhu ta'e, maaliif?

_____

_____

56. Yoo miseensa koopireetivii qonnaa taatee ykn uniyeenii taate, odeeffanoo gabaa hamamitti argata?_____

**Kutaa III. Gaaffilee odeefannoo gabaa argachuu ilaalatu**

57. Omisha kee gudisuuf ekstenshinii qonnaa ilaalchisee odeefannoo essaa argata? (debii tokko ol ta'e kennun ni danda'ama)

7 Hiriyoota irraa iddoo walgahiti ykn dhugaatiti
8 Qote bultoota Modelii ta'an irraa
9 Hojetoota ekstenshinii qonnaa irraa
10 Radioo ykn TV irraa
11 Technologii ammayaa kan akka Mobayili, internet irraa
12 Kan biroo yoo jiraate ibsi _____

58. Kan armaan gaditti ibsame keessaa odeefannoo qonnaa aragchuuf isa kamitu si fayyada/ isa kam irra filata?

7. Hiriyoota irraa iddoo walgahiti ykn dhugaatiti

8. Qote bultoota Modelii ta’an irraa
9. Hojetoota ekstenshinii qonnaa irraa
10. Radioo ykn TV irraa
11. Technologii ammayaa kan akka Mobayili, internet irraa
12. Kan biro yoo jiraate ibsi _____

59. Odeefannoo olmaa gabaa essaa argata? (deebii tokko ol ta’ee kennuu ni danda’ama)
    8. Hiriyoota irraa iddoo walgahiti ykn dhugaatiti
    9. Qote bultoota Modelii ta’an irraa
    10. Hojetoota ekstenshinii qonnaa irraa
    11. Koopirativii qoonnaa kan miseensa ta’e irraa
    12. Radio, TV irraa
    13. Technologii ammayaa kan akka Mobayili, internet irraa
    14. Gabatee human ibsaatin hojetu kan magaala keessaa dhabatee jiruu irraa.
60. Odeefannoo gabaa argachuu ilaalchisee, kanneen armaan gadii keessaa isa kam irra caalati filata?

    7. Hiriyoota irraa iddoo walgahiti ykn dhugaatiti
    8. Qote bultoota Modelii ta’an irraa
    9. Hojetoota ekstenshinii qonnaa irraa
    10. Radio, TV irraa
    11. Technologii ammayaa kan akka Mobayili, internet irraa
    12. Kan biraa yoo jiraate ibsi_____
61. Odeefannoo gabaa hammati/yeroo meeqati argatu?
    2. Guyyaa Guyyaan 2. Torbee torbeen 3. Ji’a ji’aan 4. Kan biraa yoo jiraate ibsi_____
62. Odeefannoo gabaa yeroo barbaadameti ni argata?
    1. Yes 2. No

**Kutaa IV. Beekumsa, fayadamina fii argachuu teknolojii odaffannoo amayyaa (ICT)**

63. Odeefannoo fi Teknolojii qunnamtii armaan gaditti ibsaman keessaa isa kam ati yeroo mara iti fayadamte?
    2. Radiyoonii 2. TV 3. komputera 4. Bilbila Mobayilii
    5. Bilbila sararaa (mana) 6. Faksii 7. Kan biraa yoo ta’e ibsi
64. Odeefannoo fi Teknolojii qunnamtii armaan gaditti ibsaman keessaa isa kam ati yeroo mara iti fayadamte?

2. Internetii 2. Imelii (E-mail) 3. (computera irrati wordii)Word Processing
4. Voice mail application (internetiraan sagalee darbu)
5. Ergaa gababaa (Text message) 6. sagalee radiyooran darbu (Interactive Voice Radio)
7. Kan biraa_____

65. Meeshaa tknolojii Odeefannoo qunnamit (ICT) armaan gadidtti ibsaman keessaa isa kam akka salphaati argachuu dandeesa ykn itti fayadamta? (gaafilee tokkoo ol ta'e kennuu ni danda'u)

| Meshaa | Deebii | |
|---|---|---|
| | Eyyee | Miti |
| Radiyoonii | | |
| TV | | |
| komputera | | |
| Mobayilii | | |
| bilbilaa sarara (land line) phone | | |
| komputera interneetii qabu (computer with internet) | | |
| Faksii (Fax Machine) | | |

66. Kanneen armaan gaditti ibsaman keessaa isa kam qabda ati? (deebii tokkoo ol ta'e kennuu ni danda'u)

| Meshaa | Deebii | |
|---|---|---|
| | Eyyee | Miti |
| Radiyoonii | | |
| TV | | |
| komputera | | |
| Mobayilii | | |

| | | |
|---|---|---|
| Bilbila sararaa (Landline phone) | | |
| komputera interneeti qabu (computer with internet) | | |
| Faksii (Fax Machine) | | |

67. Kanneen armaan gaditti ibsaman kana hammam/yeroo meeqa itti faydamta? Fakenyaf hiriyootaa keef qunammuf, odeefannoo gabaa baruuf?

| | 6. Yeroo tokko oli<br>7. Guyyaati reoo tokko<br>8. Torbeeti yeroo tokko<br>9. Ji'atti yeroo/al tokko<br>10. Fayyadamee hin beeku |
|---|---|
| Radiyoonii | |
| TV | |
| komputera | |
| Mobayilii | |
| Bilbila sararaa (land line phone) | |
| komputera internetii qabu (computers with Internet Line) | |
| Faksii | |
| Kan biraa yoo jirate ibsi_____ | |

68. Meshaalee qunamtii armaan gaditti ibsaman kana yoo fayyadmate, ji'a tokkoti qarshii hagam fixa?

| | 1. Qarshii 25<br>2. Qarshii 50<br>3. Qarshii 100<br>4. Qarshii 100 oli<br>5. Fayadamee hin beeku |
|---|---|

| | |
|---|---|
| Internetifi e-mailii | |
| Mobayili fi ergaa gababaa | |
| Kan biraa yoo jirate ibsi_____ | |

**Kutaa V. Haala itti fayadamiinsa techenolojii Qunamtii fi applikeshinii odeefannoo qonnaa argachuu ilaalchisee**

69. Haala odeefannoo qonnaa ilaalchisee teknolijii odeefannoo qunnamtii (ICT) gaditi ibsaman kana fayyadamtee jirtaa? (Debii tokkoo ol ta'e kennuu danda'u)

| Meshaalee | Deebii | |
|---|---|---|
| | Eyyee | Miti |
| Radiyoonii | | |
| TV | | |
| komputera | | |
| Mobayilii | | |
| Bilbila sararaa (Landline phone) | | |
| komputera internetii qabu (computer with internet) | | |
| Faksii | | |

70. Meshaalee armaan oliti caqafte (lakk 29 jalati ibsaman) kana odeefannoo kanneen armaan gadii argachuuf hammam itti yafadamta?

| Bifa odeefannoo | Deebii | | | | |
|---|---|---|---|---|---|
| | Torbeti al tokkoo oli | Guyyaati yeroo tokko | Torbeeti yewoo tokko | Ji'ati yeroo tokko | Fayadamee hin beeku |
| Odeefannoo qonna waliin walqabate ykn gorsa omisharatti argachuuf | | | | | |
| Hojettoota ekstenshinii qonnaa waliin walqunammuf | | | | | |

71. Kan armaan gaditti caqafaman kana odeefannoo qonnaa argachuuf itti faydamtanii beektaa? (deebii tokko ol ta’e kenuun ni dannda’ama)

| | Deebii | |
|---|---|---|
| | Eyyee | Miti |
| Internetii | | |
| E-mailii | | |
| Word Processing (copmutera irrati wordii) | | |
| Voice Mail (Sagalee internetii irraan darbu) | | |
| Text Message (ergaa gababaa) | | |
| IVR | | |

72. Meshalee technolojii qunamtii (ICT) kana odeefannoo qonnaa argachuuf yeroo meeqa itti fayadamta?

| | 1.Yeroo tokoo oli<br>2. Guyyaati yeroo tokko<br>3. Torbeeti yeroo tokko<br>4. Ji’ati yeroo tokko<br>5. fayadamee hin beeku |
|---|---|
| Internetii | |
| e-mailii | |
| Word Processing (computera iraati wordii) | |
| Voice Mail(sagalee interneeti irraan darbu) | |
| Text Message(ergaa gababaa | |

**Kutaa VI. Itti fayyadama meeshaalee Teknolojii qunnamtii fi applikeeshinii isaa odeefannoo gabaa qonnaa ilaalchisee kan gaafatamu**

73. Gabaa qonnaa waliin walqabatee odeefannoo argachuuf meeshalee armaan gadii kana fayadamtee beektaa?

| Meshaalee | Deebii | |
|---|---|---|
| | Eyyee | Miti |
| Radiyoonii | | |
| TV | | |
| komputera | | |
| Mobayilii | | |
| Bilibila sararaa (land line phone) | | |
| komputera interneeti qabu (computer with internet connection | | |
| Faksii | | |

74. Odeefanno qonnaa argachuuf meshaalee teknolojii qunnamtii armaan gaditti ibsaman kana yeroo meeqa itti fayyadamta? (Deebii tokko ol ta'e kennun ni danda'ama)

| Meshaalee | 1. Yeroo tokkoo oli<br>5. Guyyaati yeroo tokko<br>6. Torbeetti yeroo tokko<br>7. Ji'ati yeroo tokko<br>8. Fayyadamee hin beeku |
|---|---|
| Radiyoonii | |
| TV | |
| komputera | |
| Mobaayilii | |
| Bilibila sararaa (landline phone) | |
| Komputera internet qabu (Computers with Internet Line) | |
| Faksii | |

| | |
|---|---|
| Kan biraa yoo jiraate ibsi | |

75. Yeroon atti meshaalee armaan gadii kana odeefanno gabaa (kan akka xa'oo, sanyii filatamaa) ittiin gaafate jiraa?

| Meeshaalee | Deebii | |
|---|---|---|
| | Eyyee | Miti |
| Radiyoonii | | |
| TV | | |
| Komputera | | |
| Mobayilii | | |
| Bilbila Sararaa (Landline phone) | | |
| Komputera internet qabu (Computer with internet connection ) | | |
| Gabatee elkteronic magaala keessa jiru (Electronic board) | | |
| Faksii | | |

76. Meshaalee armaan Olitti (lakk 35) jalati ibsite kana odeefannoo armaan gadi jiru kana argachuuf itti fayyadamtee beektaa?

| Odeefannoo | Deebii | |
|---|---|---|
| | Eyyee | Miti |
| Odeefannoo gabaa warra koopiretivee qonnaa waliin waljijjiiruf | | |
| Daldaltoota gidu galeessa irraa gatii gabaa argachuuf | | |

77. Meshaalee gaditti ibsaman kana fayyadamte gatii gurgurtaa omisha keetii namoota fayyadaman waliin dubbatenii jirta?

| Meeshaalee | Deebii | |
|---|---|---|
| | Eyyee | Miti |
| Komputera | | |

| | | |
|---|---|---|
| Moobayilii | | |
| Bilbila sararaa (Landline Phone) | | |
| Komputera internetii qabu (Computer with internet line) | | |
| Faksii | | |

**Kutaa VII. Ilaalcha itti fayyadamuu meshaalee Teknolojii qunnamtii fi applikeeshini isaa ilaalchisee**

78. Gabateen gaditti ibsame kun meshaalee armaan gadditi ibsaman fayyadamuu ilaalchisee yaada atti qabdu kan ibsuudha. (yoo si fayadda ta'e akkaata yaada kennameti ibsi)

| | | |
|---|---|---|
| | | 6. Baay'een waligala<br>7. Waliin gala<br>8. Jidu galeessa<br>9. Hin fudhadhu ykn walii hin galu<br>10. Baay'ee walii hin galu/hin fudhadhu |
| | Meshaalen Tknolojii qunnamtii (ICT) kana qotee bulaan salphaati argachuu ni danda'a | |
| | Akkamati akka itti fayydaman beekun ykn baruun qotebulaadhaaf salphaadha. | |
| | Qotee bulaan meshaalee kana itti salphaati itti fayadamuu danda'a | |
| | Qotee bulaan meshaalee kana akka salphaati argachu hin danda'u | |
| | Qotee bulaan meshalee kana bitachuuf ni danda'a (gatiin isaa xiqqaadha) | |
| | Meshaaleen kun qotee bulaadhaaf madda odeefannooti | |
| | Itti fayyadamuun meshaalee kana omishaa qonnaa ni gudisa | |
| | Itti fayyadamni meeshaalee kana qulwulina tajaajila qotee | |

| | | |
|---|---|---|
| | bulaaf kennamu ni fooyyesa. | |
| | Itti fayyadamini meeshaalee kana qunnamtii qotee bultoonni hojjetoota eksitenshinii qonnaa, dhiyeesituu xaa'oo ykn sanyii filatamaa, daldaltoota kkf taasisa ni fooyyesa. | |
| | Itti fayyadamiin meeshaalee kana qotee bulttooni gatii gabaa ilaalchisee odeefannoo sirriifi yeroti ta'e akka argatan taasisa. | |
| | Itti fayyadamini meeshaalee kana qute bultooni gabaa haara akka argatan/deeman isaan taasisa. | |
| | Itti fayyadamini meeshaalee kanaa qute bultooni bu'aa dabalata akka argatan taasisee jira. | |

**Kutaa VIII. Meeshalee teknolojii qunnamti odeefannoo (ICT) akka hin fayadamne gufuu kan ta'an**

79. Guuffuuwan armaan gaditti ibsaman keessaa isa kamtu qote bulaan akka meeshalee kanati hin fayadamne taasisa?

| | 4. Eyyee<br>5. Miti<br>6. Hin beeku |
|---|---|
| Barumsa dhabuu (Illiteracy) | |
| Rakkina affanii (meshaalen kun afaan biratin darba waan ta'ef | |
| Ogummaa Meeshaale kana dhabuu | |
| Meeshaaleen kun gatiin isaa guddaa waan ta'eef | |
| Netwokiin waan cicituuf | |
| Ibsaan hin jiru ykn addaan cicita | |
| Fayidaan meeshalee kana naaf hin galu | |
| Bu'an meshaaleen kun dinagdeef qaban naf hin galu | |
| Leenji ogummaa meshaalee kana dhabuu | |
| Kan biraa yoo jiraate ibsi_____ | |

80. Guffuuwan oliti (lakk 39) jalati ibsaman kun yoo furmaata argatan, meeshalee kana fudhachuuf ykn itti fayyadammuf qopeedha.

| | 1. Eyyee<br>2. Miti<br>3. Hin beeku |
|---|---|
| Barumsa dhabuu (Illiteracy) | |
| Rakkina affanii (meshaalen kun afaan biratin darba waan ta'ef | |
| Ogummaa Meeshaale kana dhabuu | |
| Meeshaaleen kun gatiin isaa guddaa waan ta'eef | |
| Netwokiin waan cicituuf | |
| Ibsaan hin jiru ykn addaan cicita | |
| Fayidaan meeshalee kana naaf hin galu | |
| Bu'an meshaaleen kun dinagdeef qaban naf hin galu | |
| Leenji ogummaa meshaalee kana dhabuu | |
| Kan biraa yoo jiraate ibsi_____ | |

**Annex III**

**Key Informant Interview with Woreda Office of Agriculture Development and Development Agents**

- What sort of information and communication channel (eg Interpersonal Communication, Radio, TV, Computer, Internet, Mobile Phone & etc) will you use to disseminate agriculture information to farmers in this area?
- What is the basic problem that you identified in disseminating agriculture information to farmers?
- How do you assess the availability of information and communication channel (eg Radio, TV, Computer, Inter Net, Mobile Phone & etc) in this area?
- How do you assess the use of ICT devices by farmers to get agriculture information or professional advice that enhance their productivity?
- Is there a culture of communicating agriculture extension information using ICT devices?
- If you use ICT to disseminate agriculture information, what is the advantage of using the technology?
- From the different ICT devices which one do you think is easily accessible for farmers to get agriculture related information
- In case if there are challenges that hinder the use of ICT to disseminate agriculture related information to farmers, what are the most important ones?
- Is there any possibility of using Farmers Training Institute (FTI) as a center where farmers get access to agriculture related information using ICT?
- Apart from farmers, is there a culture of using information and communication technologies by extension workers, agronomists, researchers and other professionals that give professional input for farmers?
- To disseminate agriculture and market related information to farmers through various ICT channels, what do you suggest or recommended

**Annex IV**

**Gaafillee durisitoota Waajjira qonnaa anaa Limmutif Hojjettoota misoomatiif Qopha'e**

- Qoteebultootaaf oddeefannoo qonnaa tamsaasuuf ykn dabarsuuf meshaalee qunnamtii (kan akka bilbila mobaayilii, kompitaraa, Intarneetii ykn Radiyoonii fi TV) keessaa kam fayaddamta?
- Ergaa oddeefannoo qonnaa qotebultootaf tamsaasuu irraatti rakkoowan gurguddoon ati addaan baste maalin?
- Argamina ykn jiraachuu meshaalee qunamtii odeefannoo kan akka Radiyoonii, TV, bilbila mobaayilii, internetii kkf akkamitti ilaalta?
- Haala qoteebultooni omishaa isanii gudisuufi gorsa argachuuf meshaalee ammayaa qunamtii odeefanno itti fayadaman akkamiti hubata?
- Adaan qoteebultootni meshaalee qunamtii kanati fayadamuun hojjetoota ekstenshinii qonnaa ykn hojettoota misoomaa irraa gorsa argachuuf yaalna nijiraa?
- Ati yoo meeshaalee qunnamit kanati fayadametee odeefannoo dabarsite ta'e, fayidaan isaa maali jetteet yaada?
- Meeshaalee qunnamtii adda addaa keessa isa kamtu qotee buladhaaf akka salpahati argamu danda'a? kessatuu odeefannoo qonnaa argachuuf.
- Qotee bultooni akka meeshaalee qunnamtii kanati fayyadamani odeefannoo qonnaa fi gabaa akka hin arganne  kan taasisu rakkoowan maaltu jira?
- Carraan wiirtuu leenjii qonnaati fayyadamuun qoteebultootni akka odeefannoo argatan taaseftanii jirtuu?
- Qoteebultan alati, adaan ekstenshiniin qonnaa, qoratootni, akasuma hojeetoni misoomaa meshaalee kanati fayadamn jiraa?
- Meshaalee qunnamti ammayaa kanati fayadamuun, odeefannoo qonnaa fi gabaa qotebultootaf tamsaasuf, gorsi ati dabarsitu maali?

**Annex V**

**Key Informant Interview with Woreda Office of Market Promotion Expert**

- What sort of information and communication channel (eg Interpersonal Communication, Radio, TV, Computer, Inter Net, Mobile Phone & etc) will you use to disseminate Market information to farmers in this area?
- What is the basic problem that you identified in disseminating Market information to farmers?
- How do you assess the availability of information and communication channel (eg Radio, TV, Computer, Inter Net, Mobile Phone & etc) in this area?
- How do you assess the use of ICT devices by farmers to get market information?
- Is there a culture of communicating market information using ICT devices?
- If you use ICT to disseminate market information, what is the advantage of using the technology?
- From the different ICT devices which one do you think is easily accessible for farmers to get market related information
- In case if there are challenges that hinder the use of ICT to disseminate market related information to farmers, what are the most important ones?
- Is there any ICT platform such as an electronic board where farmers can get access to market related information?
- Apart from farmers, is there a culture of using information and communication technologies by agricultural cooperatives to get market information?
- To disseminate market related information to farmers through various ICT channels, what do you suggest or recommended

**Annex VI**

**Gaafillee Hojjetaa Ogeessa gabaa Wajjira qonnaa anaa Limuti gaafatame**

- Qotee bultootaaf oddeefannoo gabaa tamsaassuf Teknolojii qunnamtii ammayaa kan akka (fuulleti walliin dubachuu, Radioyoonii, TVi, Kompitaraa, Mobayilii kkf) kam fayyadamta?
- Oddeefanoo gabaa qotebultootaaf tamsaasu irratti rakkoowan atti addaan baafate maaltu jira?
- Aragamina ykn jiraachuu teknolojii qunnamtii (kan akka Radioyoonii, TV, bilbila mobayilii kkf,) naaannoo kanati akkamti ilaalta?
- Adaan teknolojii qunnamttii ammayaa kana fayadamuun odeefannoo gabaa arcgachuu nijiraa?
- Oddeffanoo gabaa argachuuf qotebultotni Teknolojii qunnamtii Ammayaa kana haggam itti fayyadamu?
- Meshaalee teknolojii ammayaaa kan adda addaa keessaa qutebultoo oddeeefannoo gabaa aragchuuf isa kamitti irraa caala fayadamu jettee yaada?
- Odeefannoo gabaa tamsaasuf yoo teknolojii qunnamttii ammayaa kanati fayadamete, fayidaa isaa akkamitti ilaalta?
- Teknolojii qunnamtii ammayaa kana fayyadamuun Odeefannoo gabaa tamsaasu kan dhoorku/guffuu ta’an, rakkoowan jiran maali?
- Wantootni biro kan akka gabatee odeefannoo gatii gabaa tamsaasuf gargaaran ni jiraa?
- Qotee bultootan alati, adaan jotootni qonnaa, waldaa teknolojii kanati fayadamuun odeefannoo ittiin sasabatan ni jiraa?
- Karaa Teknolojii qunnamtii ammayaa kanaan, odeefannoo gabaa qotebultootaf tamsaasuu ilaalchisee gorsa maal laata?