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Contribution of Information and Communication Technology in Improving Access to Market Information among Smallholder Farmers: The case study of Kilosa District

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Abstract

This study investigates the contribution of information and communication technology in improving access to market information among smallholder farmers. The study was conducted at Kilosa District. The representative sample involved 50 smallholder farmers from two villages. A structured questionnaire was used to collect relevant information from random selected respondents. Data were analysed using statistical software. The overall findings revealed that there were great disparities in gender division of labour at the market process. Men participate much in access market information because they are the one who made decision. In other hand, women were performing more activities in the farm production compared to men who engaged themselves in market. The research concludes that there is unequal gender division of labour in the farm activities and also, on the access and use of the market information. Based on this, it is recommended that massive education campaign for mainstreaming gender is needed to both men and women who are actively engaged in smallholder farmers.

Keywords: ICT, agriculture, market information, smallholder farmers

1. Introduction

One of the main challenges facing the smallholder farmers in rural areas is lack of access to market information (Barret, 2008). Market is defined as the process of communicating the value of a product or service to customers. Marketing might sometimes be interpreted as the art of selling products, but selling is only a small fraction of marketing. As the term "Marketing" may replace "Advertising" it is the overall strategy and function of promoting a product or service to the customer or markets are arenas or places where products and services of interest to consumers are found and exchanged between consumers and sellers (Sekabira, 2012).

The literature review indicate that majority of the smallholder farmers do not have access to market information (Markelova et al., 2009). Lack of access of market information by smallholder farmers are the cause of being offered low price for their produce by the traders and middlemen (Molony, 2008). This problem is big and can be addressed through increasing access to information among smallholder farmers using Information and Communication Technologies (ICTs). In this study, ICTs is referred to an expanding assembly of technologies that are used to handle information and aid communication. These include hardware, software, media for collection, storage, processing, transmission and presentation of information in any format (i.e., voice, data, text and image), Computers, the Internet, CD-ROMs, email, telephone, radio, television, video and digital Cameras (Mekonnen and Okyere, 2012).

However, ICTs do exist in rural areas to what extent do they have helped the smallholder farmer to access market information is questionable (Lokanathan and Kapugama, 2012). This study intends to provide understand on how ICTs contribute to accessibility of market information among smallholder farmers and thus, reduce their poverty level. The study is important because it informs policy makers and other development agencies on designing specific interventions to address the existing problem in accessing market information among smallholder farmers in rural area of Kilosa district. In this study information is defined as a sequence of symbols that can be interpreted as a message. Information can be recorded as signs, or transmitted as signals. Information is any kind of event that affects the state of a dynamic system. Conceptually, information is the message being conveyed (ITU, 2010).

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Farmers need different types of information from farm preparation to post-harvest and marketing to make informed decisions. Timely information is essential to famer to increase production.

Increasing production is a major challenge facing agriculture specifically to smallholder farmers who are dominant in developing world. The smallholder farmers need to improve their farming through acquiring appropriate agricultural knowledge and information (Sanga et al., 2007). Agricultural extension officers do provide access to the knowledge, information and technology that farmers require in order to improve productivity and quality of their lives as well as livelihoods. It is hence crucial to provide farmers with agricultural knowledge and information in a quality and timely manner (Sanga et al., 2013). Although some ground-breaking inventions such as telecenters can serve as major catalysts for information, knowledge and development opportunities, the access for farmers in remote villages is restricted due to lack of infrastructure (UN, 2005). In Africa countries some initiatives have been implemented which provide market information using ICTs. For example, World Bank (2011) provides market data feeds directly to farmers via electronic display boards in 31 centers and on the website in Ethiopia. Market data is also provided via text messaging to interested mobile phone users. In addition, it provides market data in four local languages via automatic telephone messaging. According to World Bank (2011), on average about 20,000 calls were made daily via a toll free number seeking for price information. Thus free text message and free calls service helped smallholder farmers to know the situation of marketing for their commodities which included: price, location and people preference.

Over the past 10 years, there has been a remarkable progress in the use of ICT for agriculture in Africa, especially in the area of farmers' access to market information (Gakuru et al, 2009). The contribution of ICT in bringing about social and economic development has been well recognized globally (Wamala, 2012; Sanga et al., 2013). Availability of markets and market information gives farmers the power to bargain and improve their incomes, to seize market opportunities through adjustment of production plans and better allocation of production factors, and also, to use the information to make informed choices about marketing. The development and use of ICTs are playing a critical role in provision of market information as per market information needs of different actors in agricultural value chains (Okyere and Mekonnen, 2012).

Recently, the issue of agricultural market access in developing countries has been greatly considered as agenda for uplifting farmers' socio-economic aspects (Shepherd, 2007; Hoekman & Martin, 1999; Adégbidi, 2012). There has been a shift from building up farmers' production capabilities to facilitating farmers' access to markets (Magesa et al., 2014). This is due to the fact that the opportunity for smallholders to raise their income and related rural enterprises management depends on their ability to participate successfully in markets (Shepherd, 2007). There are different communication channels which farmers use to access the market information (Lokanathan and Kapugama, 2012). Communication is defined as the act of conveying information for the purpose of creating a shared understanding. It's something that humans do every day. The word "communication" comes from the Latin "communis," meaning "to share," and includes verbal, non-verbal and electronic means of human interaction (Svensson, 2008). Communication channels used to disseminate and communicate agricultural market information differ according to country. In Kenya, market information is provided through short message service (SMS) so that smallholders have access to daily agricultural commodity prices, extension messages and opportunities to sell or bid through text messages and or voicemail (KBDS, 2004; Muriithi et al., 2009; Davis and Addom, 2010). There are other rural-based market information points which are linked through an electronic information system that allows farmers to link with buyers in different urban centers (KBDS, 2004; Muriithi et al., 2009; Davis and Addom, 2010).

Before 1990, ICT use in Tanzania was mainly limited to radio and landline telephones and other ICT tools started in the mid 1990s, and by 2001 it was estimated that Tanzania's ICT industry had generated USD 300–350 million per year (Mwakaje, 2010). There are now a number of ICT development initiatives in the country funded by the Government, donor countries and the private sector (Sanga et al., 2007). Such initiatives range from telecenters and mobile phones in rural Tanzania to e-Government initiatives being implemented in the major cities and towns of Tanzania. Currently, there are many Telecommunication companies in the market (Tanzania Telecommunication Company Limited, Vodacom, Zain, Tigo and Zantel), Internet Service Providers (ISPs), Web Content Providers (ASPs), Mobile phone companies (Samsung, NOKIA) Radio, TV and Newspapers (Mwakaje, 2010). Despit of the existence of these communication channels still the farmers rely much from their fellow farmers (Magesa et al., 2014). Therefore this study aimed at investigating how ICT contribute in improving access to market information among smallholder farmers.

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According to Barret (2008), one of the constraints facing smallholder farmers' on access to markets is the lack of information about product, input and credit markets. Farmers rely on friends, relatives and extension agents for market information (Chilimo and Sanga, 2006). Smallholder farmers are those depending on household members for most of the labour or those with a subsistence orientation, where the primary aim of the farm is to produce the bulk of the household's consumption of staple foods (Hazell et al., 2007)**.** FAO defines smallholders as farmers with limited resource endowments, relative to other farmers in the sector (Dixon *et al.,* 2003).

Furthermore, poor roads and telecommunication networks, increased transactions costs and risks tend to limit access of smallholder farmers, especially those in remote areas, to participate fully in efficient and competitive markets (Poulton et al., 2006). Various projects have been developed that integrate ICTs into the dissemination of agricultural information to farmers (Sanga et al., 2013). Farmer's market information services at the national and regional level are a promising new field of research and application in the emerging field of ICT for agriculture (Gakuru et al, 2009).

The interest in the application of ICT tools in agriculture arises from the problems that farmers face in accessing agricultural market information (Okello et al., 2009). Smallholder farmers, who form the majority of farming community in developing countries, tend to be poor in terms of access to agricultural production and market information services (Okello et al., 2009; Mages et al., 2014). They respond to the high costs of agricultural exchange by being selling their produce at the farm gate rather than travelling to the market where they could get better prices (Fafchamps and Hill, 2005).

In the absence of market information, opportunistic behaviour of traders and other market actors tends to develop. Such behaviour encompasses cheating on quality and quantity (especially the use of scales that are not standard) which in turn results into the failure of traders to establish long-term business relations with farmers and other traders (Fafchamps and Gabre-Madhin, 2006).

Lack of market access is the major obstacle facing small-scale farmers and, if addressed, will improve incomes, food security, rural employment, and sustained agricultural growth (Dorward et al., 2003; Poulton et al., 1998; and Stiglitz, 2002). Accessing market information has been difficult for many years to be addressed (Hoekman & Martin, 1999; Adégbidi, 2012). The lack of market information represents is a significant impediment to market access for smallholder farmers in rural areas (Shepherd, 2007). It increases transaction costs and reduces market efficiency. The marketing chain consists of multiple middlemen, each taking a margin at every stage of the chain, and price variations in space and time are often large and erratic (Mukhebi et. al., 2007). Therefore, this study investigated how ICT contribute in improving access to market information among smallholder farmers.

ICT has currently spread even to the remote rural area which in the past lagged behind (URT, 2007). Due to this drastic change, the farmers in rural areas have been aware of the various issues of interest to them that affect their livelihood (Obayelu & Ogunlade, 2006). This has been possible due to enactment of ICt policies in many developing countries. The ICT policy has been the guiding framework towards the spread of ICT in different societies of developing countries (URT, 2007). One of objective of ICt policy of Tanzania is to enable the country to become a hub of ICT, infrastructure and ICT solutions that enhance sustainable socio-economic development and accelerated poverty reduction both nationally and globally (URT, 2007). This has contributed to setting the environment where the smallholder farmers can access information pertaining to different activities and strategies on their daily social and economic livelihood (Mekonnen and Okyere, 2012). Munyua (2000) stated that market liberalization in developing countries has not favoured smallholders farmers even though ICT tools are mushrooming in rural areas. This call for study why there is such phenomena. This study provides an insight understanding on how ICT help smallholder farmers to access market information. The finding from this study will generate empirical and theoretical information in the field of community informatics (Stillman and Linger, 2009) from which more studies could be undertaken to evaluate national ICT policies which contribute in improving the livelihood of smallholder farmers.

The main objective of this study was to investigate the contribution of the use of ICT in improving access to market information among small holder farmers in Kilosa District. The specific objectives of the study were addressed to: (i) determine the level of market information accessibility among smallholder farmers, (ii) assess how smallholder farmers use ICTs to access market information for their agricultural crops, (iii) assess the attitude of smallholder farmers towards the use of ICTs to access market information

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1.1 CONCEPTUAL FRAMEWORK OF HOW ICT CONTRIBUTE IN IMPROVING ACCESS TO MARKET INFORMATION

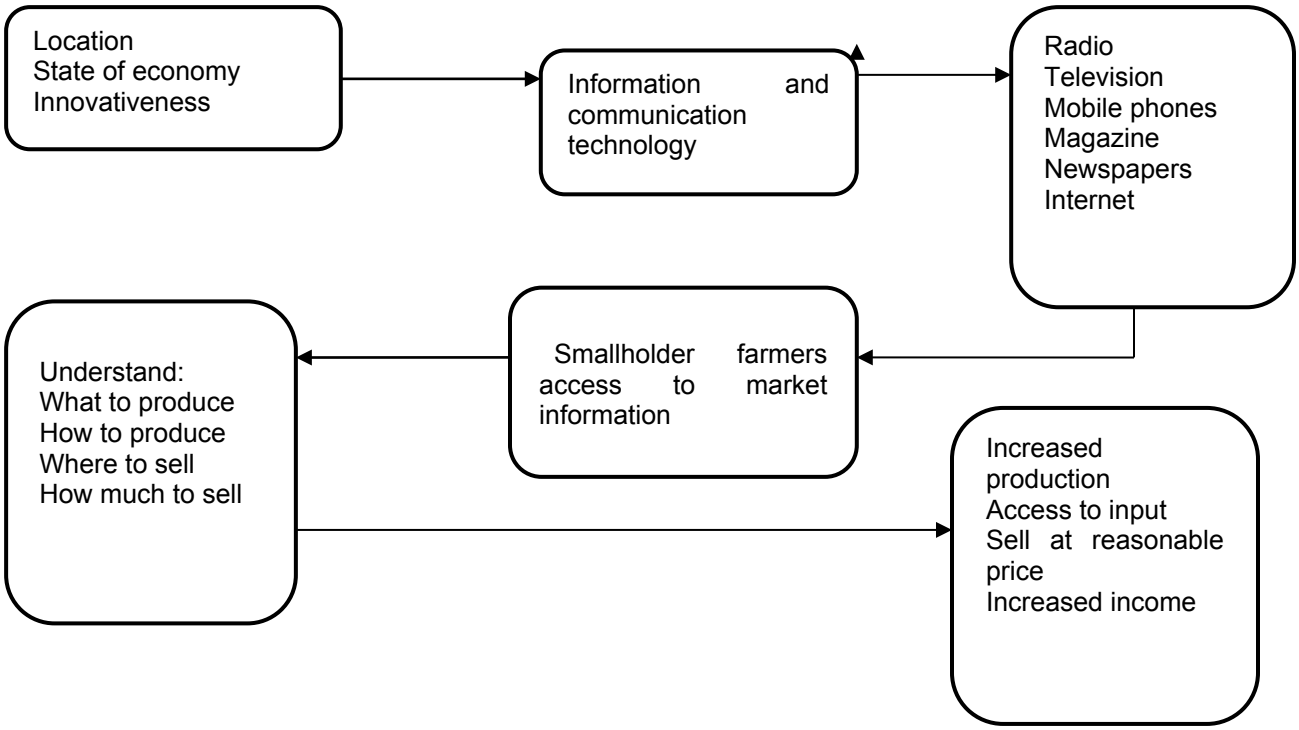

Figure 1: HOW ICT CONTRIBUTE IN IMPROVES ACCESS TO MARKET INFORMATION

The study was guided by the above framework (Figure 1). The variable which guide the study were grouped into four aspects which are background, intervening, independent and dependent variables. The geographical location of an area, state economy and individual innovativeness influence the spread of ICT in a particular area. However, radio television, mobile phones, magazine, newspapers, Internet plays a big role to influence smallholder farmers to access market information while at the same time smallholder farmers will be able to understand what to produce, how to produce, where to sell, how much to sell. Through these ICT tools they facilitate smallholder farmers to increase production, access to input, sell at reasonable price and increase income.

In this article, a farmer is referred as a person engaged in agriculture, who raises living organisms for food or raw materials, generally including livestock husbandry and growing crops, such as produce and grain. A farmer might own the farmed land or might work as a labourer on land owned by others, but in advanced economies, a farmer is usually a farm owner, while employees of the farm are farm workers or farmhands (Jensen, 2007).

The article is organised as follows: the first section presents the background which outlines the introduction, problem statement and justification of the study. The next section presents the literature review as per mentioned specific objectives. Thereafter, the research methodology adopted in this study is present. Then the results and discussion section is presented. Finally, the conclusion, recommendations and future research directions are presented.

2.0 LITERATURE REVIEW

2.1 Availability of ICTs used by small holder farmers

The ICT tools which are owned by many rural farmers are radio and mobile phones. The increase in the use of ICT has been in mobile telephony where subscriptions in developing countries increased from about 30 percent of the world total in 2000 to more than 50 percent in 2004 and to almost 70 percent in 2007 (Cieslikowsk et al., 2009). It is argued that mobile voice telecommunication leads the market in Tanzania by having more subscriptions (98%) than to fixed line services (2%) (TCRA, 2007). Mtega (2012) argues that the main source of agricultural information used in Kilosa district include radio, newspapers, television and mobile phones. This concurs to the studies by Sanga et al. (2013, 2014) which were done in Kilosa. However, the choice of information sources is always influenced by

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individual traits of the information seekers variables such as farm size, years in farming, age, level of education, and gross income level (Riesenberg and Gor, 2011; Nyamba and Mlozi, 2012).

2.2 The level of accessibility to market information among smallholder farmers

It is increasingly recognized that ICT is necessary for accessing required agricultural information and knowledge (Aker et al., 2010). Akter and Fu (*n.d)* present that in many developing countries more than 80% population have access to mobile phones, these tools enable smallholder farmers to access market information. Despite significant growth in the penetration of ICTs, the more traditional ones, radios and to some extent TVs, remain popular in Africa, particularly in rural areas (Gillwald et. al., 2010). Access to ICTs is even made one of the targets of the Millennium Development Goal number eight (MDG 8), which emphasizes the benefits of new technologies, especially ICTs in the fight against poverty (Mekonnen and Okyere, 2012). This has created an enabling environment for established new initiatives for developing electrification, mobile communication and localized market information. Markey information system is defined as information systems used in gathering, analyzing and disseminating information about prices and other information relevant to farmers, livestock keepers, traders, processors and others involved in handling agricultural products. Market information systems play an important role in agro-industrialization and food supply chains (Barrios, 2011).

2.3 Importance of ICT to access market information

Mobile phone penetration has been growing rapidly even in the remote rural areas. The unprecedented speed of adoption of mobile phone has raised the general expectations about its potential contributions to spread of innovative farming technology, as well as farmers' knowledge and awareness of other relevant knowledge and information (Heeks and Molla, 2009).

It has been observed by Mekonnen and Okyere (2012) that Internet and mobile phones is increasingly bringing market information, financial services, and health services to remote areas. ICTs are believed to bring about social and economic development by creating an enabling environment to close the digital divide for urban and rural areas. Many activities in the modern world are becoming more dependent on the application of ICTs for one use or another. The benefit of ICTs has increased in such a way it reaches even those who do not themselves have first-hand access to them. Through ICTs, for example, an agricultural extension worker can learn new technologies, rainfall forecasts, commodity prices and use such information to advice farmers in rural communities (Sanga et al., 2013; Nyamba and Mlozi, 2012).

In this study, technology is defined as the making, modification, usage, and knowledge of tools, machines, techniques, crafts, systems, methods of organization, in order to solve a problem, improve a pre-existing solution to a problem, achieve a goal, handle an applied input/output relation or perform a specific function. It can also refer to the collection of such tools, machinery, modifications, arrangements and procedures (World Bank, 2005). In order to achieve the indented goal from the technology, farmer must adopt it through their altitude change.

2.4 Attitude of smallholder farmers towards ICT

According to Shiro (2008), rural communities have positive attitude towards ICT and they welcome any ICT project executing in their vicinity. Also, Dixon (2009) stressed that usage and exposure to ICT by farmers is a key factor to ensure a positive attitude towards ICT by rural communities. This is important for farmers to understand the usefulness of ICTs in their daily life and for adoption of new ICT tools.

Rogers (2003) argues that perceived usefulness must be persistent. In order for ICT to be perceived useful it must be low cost and also, it must have the ability to reach a wider market and be able to gather large information within a short time. In Tanzania, smallholder farmers have positive attitude towards ICTs and its importance in enhancing market information accessibility (Mtega, 2012). This has been evidenced by the fact that the majority of farmers own one or more ICTs in their households. However, those who own none of the ICTs rely much on friends, relatives and other community members as well as to community information centre (telecentre) for accessing information on various aspects of their day to day activities.

2.5 Factors influencing the use of telecenter in rural areas

There are number of factors that influence the use of telecenter in improving access to market information. Gender is one of the factors that influence the use of a given telecenter to access market information. Hudson (2000) reports

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that women are more likely to use telecenter in order to be able to get market information. This improves their knowledge on market information. Also, women are more likely to use the telecenter if there are female staffs in the telecenter rather than if in the available telecenter has only male staffs (Hudson, 2000).

Furthermore, Ellen (2003) points out that lack of telecommunication networks, limited types of services, costs of using services and lack of information skills among users are other common factors affecting the use of telecenters. In addition, Owen and Darkwa (2000) reported that poor communication infrastructure in rural areas and few competent human resources as other factors limiting the use of telecenters in rural areas. Moreover, Etta (2003) states that change of mindset to adopt new ICT is another factor affecting use of the telecenters in rural areas.

In summing up, in this section different literature has been reviewed as far as ICTs used by smallholder farmers is concerned. The trend shows mobile phone is used mostly by rural communities (Qiang, 2009) thus have capability to improve the level of accessibility to market information among smallholder farmers Akter (2012). Thus this study seeks to fill the gap which has been identified in literature by proving the assessment of contribution of ICT in improving the accessibility of market agricultural information.

3.0 METHODOLOGY

3.1 Description of the study area

The study was conducted at Kilosa district in Morogoro region. The reason for selecting this study area is that many people in the District engage in smallholder farmer's activities (Movek, 2008). Also they who depend much on ICTs to access market information from various places in the country including Dar es Salaam. Kilosa district is surrounded by Tanga region and Arusha region in North, Morogoro rural district in East, Kilombero district and Iringa region in South and to the west is surrounded by Dodoma region. Kilosa district has a land of 14,918 Km Square and also its geographical coordinates are 7°0'0" North, 37°0'0" East. Kilosa district administratively has 9 divisions, 36 wards and 132 villages. The main economic activities of people in Kilosa district is farming and livestock keeping.

3.2 Economic Activities

The major economic activity conducted by people at Mkwatani ward is agriculture. Few people engage in small scale business at Mkwatani ward. The crops which are produced by the farmers are both food and cash crops such as rice, maize, potatoes, bananas, sugarcane and cassava (Movek, 2008)

3.3 Population of the study

The study involved smallholder farmers in the area including those who have access to market information and those who are not.

3.4 Research design

A cross-sectional research design was used in this study. The cross-sectional design allows data to be collected in a single point in time and data collection was done at once. The reason for choosing this research design was due to limited resources in terms of time and research funds.

3.5 Sampling procedure and sample size

3.5.1 Sampling procedure

The study employed purposively sampling techniques to select the sample size for the study. Non probability sampling techniques was used to purposely select villages for the study. Two villages were purposely selected for the study which included Manzese and Mtendeni. The reason for selection was that they have been involved in other ICT for agriculture project (Sanga et al., 2013). Probability sampling technique was used to select smallholder farmers in the village with assistance from village leaders of the respective village.

3.5.2 Sample size

The sample size for the study was 50 smallholder farmers. It consists of 25 smallholder famers from each village.

3.6 Data collection

Data collection involved a combination of both quantitative and qualitative methods. The intention of using both research methods was to complement each other to ensure good outcomes.

3.6.1 Primary data collection

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Questionnaires and interview were used to collect quantitative data from individual smallholder farmers.

3.6.2 Secondary data collection

Secondary data which relate to the objectives of this study were collected from various information including ward offices in the study area.

3.7 Data analysis

Statistical package for social science (SPSS) was used to analyze data collected using questionnaire from which various statistical computations (such as frequency and percentage) were done.

With reference to the specific objectives, data were analysed as explained below:

i. The level of accessibility to market information among smallholder farmers was analysed in terms of percentages of small holder farmers accessing ICTs.
ii. The assessment how small holder farmers use ICT to access market information for their agricultural crops was analyzed in forms of frequencies and percentages of smallholder farmers using ICTs.
iii. The attitude of smallholder farmers towards information and communication technology was in terms of frequencies and percentages of agreement or disagreement through Likert scale analysis.

4. 0 FINDINGS AND DISCUSSIONS

4.1 Introduction

In this section the results and discussions of the study are presented in line with the research objective, which was to investigate the contribution of ICT in improving access to market information among smallholder farmers. The section is divided into five sub sections as follows; the first subsection presents respondents' socio-economic characteristics which includes, sex, age, and marital status and education level. The second sub-section presents an assessment of the availability of ICTs in Kilosa. The third sub-section determines the level of accessibility to market information among smallholder farmers in the study area. The fourth sub-section assesses how small-holder farmers use ICTs to access market information related to agricultural produce. The last sub-section assesses the attitude of smallholder farmers towards the use of ICTs to access market information.

This study involved 50 respondents from two selected villages which were Manzese and Mtendeni. From each villages there was 25 respondents who were randomly selected in which 10 males and 15 females from Mtendeni and 15 males and 10 females from Manzese. All these respondents were of different age and educational background.

Data coding was done by using SPSS from which data editing was done to check inconsistencies. Qualitative data were analysed as per responses of respondents from which information based on the frequency of occurrence were used to add value to the quantitative data. Quantitative data analysed was done from which frequency and percentages were obtained.

4.2 Respondents' Socio-economic Characteristics

This section presents the socio-economic and demographic characteristics of the study population. The distribution of respondents by socio-economic and demographic characteristics is as follows:

4.2.1 Sex of Respondents

Since the purpose of this research was to investigate the contribution of ICTs in accessing market information among smallholder farmers, it was inevitable to present the structure of the study population by sex. In this study, both women and men were randomly selected in the same proportions where by women were slightly many because are the one playing big role in farm activities compare to male. This also found in Kilosa where most of the female did farming and marketing activities in comparison to men (Table 1).

Table 1: Respondents' Sex Distribution (n = 50)

Sex	Frequency	Percent
Male	24	48.0
Female	26	52.0
Total	50	100.0

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Source: Field data, 2013

4.2.2 Respondents' Age

Age is a very important variable determining the state of participation for both women and men in any economic activities like farming. Moreover with age, it is very easy to determine the labour force of the community and country at large. For example, in Tanzania people aging 18 -65 are regarded as productive age group (URT, 2007). Overall, majority of the respondents aged 35-44 years, followed by those aged 25-34 (Table 2). These implies that respondents interviewed were mature individuals engaged in smallholder farming in the study area and also are able to realize the contribution of ICTs in improving access to market information.

Table 2: Respondents' Age Distribution (n = 50)

Age	Frequency	Percent
15-20	1	2.0
21-24	8	16.0
25-34	15	30.0
35-44	19	38.0
45-60	7	14.0
Total	50	100.0

Source: Field data, 2013

4.2.3 Marital Status of Respondents

This analysis aimed at investigating whether respondents were married or not. The overall findings revealed that majority of respondents were married couples while a few were not married and widowed respectively (Table 3).

Table 3: Respondents' Marital Status (n = 50

Marital status	Frequency	Percent
Married	22	44.0
Single	18	36.0
Divorced	4	8.0
Widow/ widower	5	10.0
Total	49	100

Source: Field data, 2013

4.2.4 Education Level of Respondents

Education and training equip smallholder farmers with skills that enable them to live and positively contribute towards the development of their society. The overall findings indicate that majority of the respondents had primary education (Standard VII) which means they can write and read. From this, it shows that they are able to access market information through their mobile phones and computer using different Internet services. For some who did not go to school at all, it will be difficult to use mobile phones and computer in searching market information but for those few who had Secondary level of education (Form IV) they can get information easily compare to those who have adult education, primary education and who did not attend to school at all (Table 4).

Table 4: Respondents' Education Level (n = 50)

Education level	Frequency	Percent

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None	6	12.0
Primary education	21	42.0
Secondary education	12	24.0
Adult education	8	16.0
Vocational training	3	6.0
Total	50	100

Source: Field data, 2013

4.3 Availability of ICT tools in Kilosa

Communication technologies used by smallholder farmers was the central focus of the study. The study shows that a number of ICT tools were available in the area including radio, mobile phone, television, computer, magazine and newspaper. This is similar to findings previous studies who found that the main source of information communication technology used in Kilosa district were radio, newspapers, television and mobile phones (Mtega, 2012; Sanga et al., 2013, Sanga et al., 2014, Sanga and Buzingo, 2014). The choice of information sources is always influenced by individual behaviour which depends on information seekers variables such as farm size, market information years in farming, age, level of education and gross income level. The television channels accessible in the area under this study include: TBC1, Channel 5, ITV, Abood TV, Star TV while the radio stations accessible were radio: Kilosa Community Radio (Jamii Kilosa), radio Ukweli, Clouds fm, Tbc fm and radio Free Africa. In terms of newspapers that are regularly available include Mwananchi, Nipashe, Leteraha, Sani, Ijumaa, Mwanasport, Uwazi, Alasiri, Majira, Risasi, Mtanzania and Kiu. The mobile phone companies operating in the area include Tigo, Vodacom and Airtel. Some agricultural information and knowledge disseminated by these ICT tools help smallholder farmer's access to market information (Sanga and Buzingo, 2014).

4.4 Availability of mobile phones to smallholder farmers

Mobile phone is mostly used ICT tool by people especially in rural area (Sanga et al., 2014). The study shows that majority of smallholder farmers have mobile phones. For this reason, it assures that some smallholder farmers have a means to access to market information disseminated through mobile phones. For those who can read the SMS they can be able to understand what to produce, where to sell and how much to sell. This is from Tigo Kilimo and Z-Kilimo. This will help them to increase production and sell at reasonable price (Table 5). This is similar to findings by Akter and Fu (n.d) who concluded that in many developing countries more than 80% population have accesses to mobile phones, which enable smallholder farmers to access market information. This is the reason that availability of ICTs like mobile phones is even made one of the targets of the Millennium Development Goal number 8 which emphasizes the benefits of new technologies especially ICTs in the fight against poverty (Mekonnen and Okyere, 2012).

Table 5: Respondents have mobile phones and who do not have (n=50).

Mobile phones	Frequency	Percentage
Those own mobile phones	39	78.0
Those does not own phones	11	22.0
Total	50	100

Source: Field data, 2013

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Therefore, this study shows that male who have mobile phone were 20 and those who do not have are 4 while female who own mobile phone were 23 and who do not have were 3. This means that female and male has almost equal access market information using mobile phones (Table 6).

Table 6: Number of male and female who own and do not own mobile phone

Male own mobile phone	20
Female own mobile phone	23
Male who do not have mobile phone	4
Female who do not have mobile phone	3

Source: Field data, 2013

4.5 Availability of Radio

For a long time, radio has remained the most widely used source of information in rural areas. This study revealed that majority of smallholder famers have radios since their economic status allow them to own. In this study, those who have radio were 43 and those who do not have were 7. This indicate that majority of female and male have availability to own radio at their home which enable them to access market information news and only few who has no radio can be updated by friends or relatives or neighbours (Table 7).

Table 7: Respondents have radio and who do not have (n=50)

Radio	Frequency	Percentage
Those own radio	43	86.0
Those does not own radio	7	14.0
Total	50	100

Source: Field data, 2013

4.6 Availability of computer among smallholder farmers

Being one of the ICT tool, this study aimed investigating the availability of computers among smallholder farmers. The study reveals that majority of respondents do not have computer, only 2 female have computer. The reason given by respondents was that computers are too expensive compare to their income and also, they do not have knowledge and skills in using computer. Thus smallholder farmers cannot access vast information about market available on Internet through computer at their home (Table 8).

Table 8: Respondents have computer and who do not have (n=50)

Computer	Frequency	Percentage
Those who own computer	2	4.0
Those who do not own computer	48	96.0
Total	50	100

Source: Data field, 2013

4.7 Access to ICTs tools

Accessibility to ICT tools among smallholder farmers was investigated in this study. The study found that majority of farmers has access to one or more ICT tool available in the study area for market information (Table 7, Table 8, Table 9).

4.8 Access to Radio

Accessibility to radio among smallholder farmers is vital. It is revealed by this study that 88% of smallholder farmers have access to radio as their source of market information. Radio has helped them in knowing different kind of crops which were needed at the market through business news which were presented in most of the radio stations. Farmers who have radio cannot guarantee access of market information but listening to the radio is necessary and

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sufficient for farmer to access market information. In total 44 respondents had access to radio and out of this, female were 23 and male were 21 (Table 9).

Table 9: Smallholder farmers' access to radio

Access to radio	Frequency	Percentage
Those have access to radio	44	88.0
Those who do not have access to radio	6	12.0
Source: Field data, 2013		
Total	50	100

Source: Data field, 2013

The result is similar to findings by Gillwald et al. (2010) who stated that in Africa despite significant growth in the penetration of emerging ICTs, the more traditional ones are radios and to some extent TVs, remain popular in rural areas. It was further revealed that the extent to which smallholder farmers access market information through radio differs, because some use all day in a week, some listen 5days in a week and others 3days in a week this can be due to their farm activity which keep them busy but in other hand some of smallholder farmers do not have tendency of listening radio that why there is difference (Table 9). This is similar to the findings from the study by Sanga et al. (2013).

Table 10: Frequency of Smallholder farmers listening radio for market information in a week

Smallholder farmer	Frequency	Percentage
Those listening all days	33	66.0
Those listening 5days	4	8.0
Those listening 3days	7	14.0
Total	44	88.0

Source: Field data, 2013

4.9 Access to Internet services

Due to the wide spread of ICT tools especially mobile phones in rural areas farmers may access market information through Internet. The study revealed that more than half (52%) of the respondents had access to Internet services for market information through the mobile phones they own. Since now days many company sell phone with a package of free Internet access hence this made smallholder farmers be able to access market information through their mobile phones. This is similar to observation of Mekonnen and Okyere (2012) who argue that Internet or mobile phones is increasingly bringing market information to remote areas and is helping to change people's lives in different ways which lead to smallholder farmers understand what to produce, how to produce where to sell and how much to sell through access to Internet services (Table 11).

Table 11: Smallholder farmer's access to Internet services through mobile phones

Access to internet services	Frequency	Percentage
Those have access to internet services	26	52.0
Those who do not access internet services	24	48.0
Total	50	100

Source: Field data, 2013

4.9.1 Attitude of smallholder farmers toward ICT tools

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Attitude is one of the criteria used to measure how people or community values the use of ICT in improving access to market information. Likert scale was used where there were 10 statements to gauge the level of attitude to be measured in three groups such as (i) 10-29 points represented by unfavourable attitude, (ii) different attitude was represented by 30 points and (iii) favourable attitude was represented by 31-50 points. Therefore, the study identified that majority (52%) of smallholder farmers have favourable or positive attitude towards ICTs in improving access to market information because most of smallholder farmers argue that ICTs contribute much in getting market information. This corresponds to findings by Shiro (2008) who found that rural communities have a very positive attitude towards ICT and they welcome any ICT project to be developed in their areas. Also, it relates to the findings by Dixon (2009) who stressed that frequent of using ICT tools by respondents and their exposure to ICT tools must be considered if someone wants to assess attitude towards ICT.

But for those farmers who have unfavourable (30%) and indifferent attitude (18%) they do not realize that ICTs is important simply because they have not been exposed to ICT tool while accessing market information (Table 12).

Table 12: Attitude of smallholder farmers toward ICT tools

	Frequency	Percentage
Unfavourable	11	22
Neutral	10	20
Favourable	28	56

Source: Field data, 2013

Other respondents are using information board to access market information which are displayed at community information centre (KIRSEC) and shops selling farm inputs (Figure 2). Also, some respondents said that they normally access market information about livestock at KIRSEC using the website called LINKS (http://www.lmistz.net).

Figure 2: Information board at KIRSEC

LINKS stands for Livestock Information Network Knowledge System, a web based livestock marketing Information System. Its development started in 2005 under the Global Livestock Collaborative Research Support Project (GL-CRSP) funded by USAID. This system is used by Tanzania, Kenya, Uganda and Ethiopia, with each country run its own system. For Tanzania LINKS is under mandatory of Government of Tanzania through the Ministry of Industry and Trade since June 2009. In Tanzania, the system covers 53 livestock markets of which 41 are primary livestock markets and 12 are secondary livestock markets spreading over all districts (CNRIT, 2013).

5. Conclusion

5.1 Overview

In terms of availability of ICT tools the study concluded that ICTs are somehow available in Kilosa ward to the extent of ensuring improvement of market information accessibility among smallholder farmers. The presence of

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mobile phones, radio, television and newspaper are largely contributed to the improvement of access to market information.

In terms of accessibility to ICTs, smallholder farmers have access to ICT tools of different types and for different uses and this should be encouraged to exploit the opportunity provided in improving access to market information. Also ICT is important in ensuring that smallholder farmers have sustainable and reliable source of market information and ICTs act as a bridge between farmers and the market instead of using the middlemen. Therefore ICTs is important for smallholder farmers to have improved access to markets and market information. It eliminates the middlemen who in most cases benefit much by having market information.

With respect to attitude, the study generally found that smallholder farmers view ICTs positively. ICT tools are helping them in social terms and also are benefiting from ICTs in improving their livelihoods including improved bargain power after being able to access to market information.

5.2 RECOMMENDATIONS

- The District council should encourage the use of ICTs to improve market information accessibility.
- The smallholder farmers should be encouraged to use various low cost ICTs for social and economic purposes which are available in their locality.
- The District council should provide basic ICT educational training relating marketing information to farmers and other actors in agricultural value chains.
- The Distrcit council should ensure gender equality in all agriculture activities. The emphasis should be on the participation of both men and women in all farming activies.
- The District council should emphasis on applications which run on low cost mobile phones. The application can range from mobile money, e-government, crop e-insurance, e-commerce, e-business and e-health.
- Community, public and private partnership (CPPP) is needed to develop mobile based system for market information system.

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