HARNESSING INFORMATION AND COMMUNICATION TECHNOLOGY FOR INFORMATION ACCESS AND USE AMONGST FARMERS IN LOWER YATTA DISTRICT, KENYA

BY

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DECLARATION

Declaration by Candidate

This research thesis is my original work and has not been presented for a degree in any other university.

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DEDICATION

To my loving husband Francis Kiilu and my lovely children, Valentine, Vanessa and Vernon.

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ABSTRACT

Kenya relies heavily on agriculture for economic growth, and for this to be realized, information is one of the key ingredients for improved agricultural production. Farming is mainly practiced in the rural areas. Information requirements of rural farmers are varied, and complex. The information delivery mechanisms in place do not take into account the characteristics of the rural farmer. Lack of proper information infrastructure also affects information delivery. The aim of this study was therefore to investigate the use of ICTs in the access and use of information by rural farmers in Lower Yatta District of Kitui, Kenya and recommend a suitable model for optimizing ICT use in information provision. The objectives of the study were to identify the information needs of the farmers, examining channels of communication and sources of information, map and audit types of ICTs available, identify the legal frameworks in place in support of information access and determine the challenges faced by farmers when accessing and using ICTs. The study was informed by Info-mobilization theory with regard to information systems and their application in communities, Wilson's general model of information behaviour as it relates to information use and users and Information innovation adoption model with regard to ICT adoption by farmers. Cluster sampling was used to divide the district into locations, and then purposive sampling was used to get respondents from each location. The field study was conducted among 51 rural farmers and 9 key informants in the district. The study employed a qualitative research method using survey research paradigm, which focused on understanding and interpreting the utilization of ICTs in accessing information by rural farmers in Lower Yatta District. Interviews were conducted using semi-structured interview schedules supplemented by observation and document review methods. The data collected were analyzed through content analysis and interpretation techniques after the initial editing; coding, classification and tabulation. Amongst other findings, the results indicate firstly, that there is information provision through ICTs on agricultural activities, but farmers rarely access and use the information. Secondly, the information provided is not localized to the meet the community's needs. Thirdly, that most farmers mostly used the conventional ICTs compared to the emerging ICTs. The study recommends that farmers to be advised on how to access agricultural information and shown the importance of applying the information in the agricultural practice, and policy makers should put in place policies and develop information systems which will ensure that information provided is relevant to the community. The government should intervene and facilitate the improvement of ICT infrastructure in the District through low-cost and high quality connections. The study also proposed a model for optimizing information access and use through ICTs.

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LIST OF ABBREVIATIONS

AEOs – Agricultural Exension Officers

CBO – Community Based Organizations

COMESA – Common Market for Eastern and Southern Africa

DFID – Department for International Development

DO – District Officer

EC – European Commission

ICT – Information Technology Communication

IMF – International Monetary Fund

KNBS – Kenya National Bureau of Statistics

MP – Member of Parliament

NGOs – Non-Governmental Organizations

SMEs – Small & Medium Enterprises

SMS – Short Messaging Service

TV – Television

UN – United Nations

WSIS – World Summits on the Information Society

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CHAPTER ONE:

INTRODUCTION

1.1 Background Information

Kenya has relied heavily on the agricultural sector as the mainstream for economic growth since independence (Kiplang'at, 2005). Knowledge and information are basic ingredients for increased agricultural production and productivity. Kiplang'at (2005, p. 235) observed that "the key to increased agricultural production ultimately lies with the nation's ability to disseminate relevant information to the farming community to facilitate the effective adoption of new production techniques, application of agricultural inputs, decision making on markets, prices and methods of conserving water, soil and vegetable resources". In other words information is a critical resource in the operation and management of the agricultural enterprise. Effective agricultural information delivery requires recognition of the needs of the farmers and the determination of how best to provide them with the information they need. Access to the right information at the right time in the right format and from the right source may shift the balance between success and failure of the farmer. Opara (2008) has noted that identification of the different sources being used by rural farmers is needed to bring out the relevance of these sources as well as the preference assigned to the different types of sources.

Various studies have been done in relation to agricultural information and its delivery to farmers (Kiplang'at, 2005; Lwoga, 2008; and Opara, 2008). These studies show that wide range of sources of agricultural information is available to farmers. Therefore, choice of appropriate medium is crucial in agricultural information delivery. This is

because the desire to use or not to use a particular information channel is affected by the channel's disposition and information demand characteristics. A source of information must be credible, reliable and familiar to the user before he uses it; and this is particularly so where there are alternative sources.

Mass media is one of the channels through which information can be delivered to rural farmers. Venkatesan (1995, p. 67) notes that "mass media are particularly effective in making farmers aware of new technologies and thereafter, they can always approach the extension agents, whose job is to deliver repackaged agricultural information from subject matter specialists to farmers for application in their farming practices".

Rural areas are faced with a couple of challenges when it comes to accessing information through ICTs, and Opara (2008, p. 91) has identified "poor reception quality, inadequate area coverage, poor infrastructure and inappropriate broadcast time" as some of the drawbacks of delivering information through ICTs.

The foregoing background emphasizes the need for a study to identify how ICTs can be used as an enabler in accessing agricultural information and examining the current status of information provision to rural farmers of Lower Yatta district and the preference assigned to the sources accessible to them in order to determine the best sources of delivering this information.

1.2 Background to the Study

Kenya is a republic that is divided into 8 provinces. The provinces are subdivided into several districts. Lower Yatta District is a newly created district curved from the former Kitui District-Eastern Province. The main economic activity in this area is agriculture. The agricultural practice in this area can be described as poor and not productive, and this can be attributed to poor climatic conditions, high illiteracy levels, and poor agricultural practices.

According to KNBS (2009, p.28), the larger Kitui District covers an area of 7,172.3 km^2. The climate of the area is arid and semi-arid with very erratic and unreliable rainfall. Most of the areas are generally hot and dry leading to high rates of evaporation. The annual rainfall ranges between 500-1050mm with 40% reliability (Kenya National Mapping, 2004).

According to KNBS (2009, p. 82), Kitui district has a rural population of 327,248 people with Lower Yatta District having a rural population of 52,826 people. Low agricultural productivity in this area can be attributed to poor farming methods, lack of knowledge on the best farm inputs, poor farming methods and poor government policies on development in the area. Agriculture in Lower Yatta is mainly subsistence and is characterized by low inputs and outputs. Most farms are integrated mixed units consisting of cattle, bee, and crop farming.

Information access in this area is mainly from radio, TV, newspapers, agricultural extension officers, NGOs, and churches. Although there are various avenues through which these farmers can access agricultural information, they have not been utilized successfully. It is against this background that this study sought to investigate the role of ICTs in providing this information to rural farmers.

1.3 Statement of the problem

Rural farmers require various types of information for their day-to-day agricultural activities. Ozowa (1995) noted that “no one can categorically claim to know all the information needs of farmers especially in an information dependent sector like agriculture where there are new and rather complex problems facing farmers every day”(p. 37). Information needs of rural farmers are varied. Lower Yatta District is no exception. With such varied needs, it becomes quite difficult for any information system to meet all these needs.

Modes of information delivery have to be redefined to take into consideration the characteristics of the rural farmer. However, the channels used to deliver information to rural farmers in Lower Yatta have not been designed bearing the characteristics of the farmer, and this presents problems to them when accessing information. For instance, emerging ICTs have not been adequately utilized by farmers in Lower Yatta. The same has been observed by various empirical studies (Chatman, 1983; Aboyade, 1987; and Opara, 2008).

Metei (2009) notes that, an information support system is a prerequisite for sustainable agricultural development, yet “rural areas in most developing countries lack proper information infrastructure and services”(p.35). Due to this, rural farmers are not getting the right information at the right time. In addition to an information system being available to the rural farmers, there is need for such a system to be accessible, relevant and easy to use. Lack of electricity, poor mobile network connection, and lack of internet connection have made access and use of ICTs to access information a challenge.

The Government of Kenya through the Ministry of Agriculture has developed various innovations and initiatives in provision of agricultural information. For instance Ministry of Agriculture provides information through its portal, Kenya Plant Health Inspectorate Services (KEPHIS), one of the major stakeholders in the agricultural sector has come up with various initiatives to provide farmers with agricultural advisory services through conventional ICTs, and many more. Although efforts have been put in place to transfer technologies through ICTs there is no evidence of how the farmers are accessing and utilizing agricultural information.

Lower Yatta District is in rural area and the issues discussed above affect information access and use by farmers in this area. The area is sparsely populated bringing in the problem of centrally providing information infeasible. Most of the farmers are illiterate bringing a challenge in information delivery. It is against this backdrop that this study investigated how ICTs can be optimally used to provide information to the rural farmers of Lower Yatta District.

1.4 Aim of the study

The study aimed at investigating the use of ICTs in access and use of information amongst rural farmers in Lower Yatta with a view to recommend a model to optimize ICTs use in information provision.

1.5 Objectives of the study

The objectives of the study were;

1. To identify the information needs of rural farmers in Lower Yatta District.
2. To map and audit types of ICTs available and their extent of use by farmers in Lower Yatta District.
3. To examine the channels of communication and sources of information used by farmers in Lower Yatta District.
4. To identify the government initiatives in place to support information access and use in Lower Yatta District.
5. To determine the challenges faced by rural farmers when accessing and using ICTs and suggest possible solutions to mitigate them.
6. To create a model for optimizing use of ICTs in information provision.

1.6 Research questions

The study will seek to answer the following research question:

1. What ICTs are available to rural farmers?
2. What kind of information is needed by rural famers in their daily activities?

3. Where do the rural farmers get the information they need for their agricultural activities?
4. How does access and use of information affect agricultural production by farmers in this area?
5. How do the rural farmers use these ICTs?
6. What initiatives has the government put in place to support information access and use?
7. What challenges do rural farmers face when accessing information?

1.7 Assumptions of the study

According to Harris (2004), ICTs have been used in other development programs successfully and therefore they can play a supportive role in agricultural development programs. Harris adds that, information is a development enabler and an informed society is a development conscious society.

The study will be based on the following assumptions:

1. Rural farmers in Lower Yatta District are poor because they lack relevant information about economic activities and development issues.
2. Provision of relevant information to the farmers can increase their productivity.
3. There is inadequate use of suitable ICTs in the provision of information.

1.8 Significance of the study

This study will provide basic information for further research on ICT driven agricultural development in rural areas. In identifying factors that affect ICT use will help stakeholders who work with rural farmers to put into consideration these factors. Key

policy makers will know the problems and challenges faced by rural farmers and therefore find possible solutions to help them. Knowledge of the level of ICT use in farming will contribute toward shaping government policies in agricultural development.

Further the results of the study will enable researchers, policy makers and other interested parties better understand the ICT needs of rural farmers. Also the findings can be used to develop a benchmark for similar studies.

In addition, the study will propose a model for optimizing ICT use by rural farmers. This model can be used to develop a decision making support tool for farmers on which ICTs to adopt in their farms, and how they can adopt certain ICTs.

1.9 Scope and limitation of the study

The study generally covered Lower Yatta District, part of former Kitui District. Although the study covered general ICTs, and it was limiting itself to radio, TVs and mobile phones because they were the ones accessible to the farmers in the study area, the study was also limited to farmers found in Lower Yatta District who had used ICTs. It limited itself to farmers because according to KNBS statistics (2009), they make the largest population.

1.10 Definitions of terms

Agricultural information – published and unpublished knowledge in all aspects of agriculture

ICTs – devices used in transmission of information

Rural farmer – A person practicing any form of agriculture in a rural setting

Information access – This is the ability to find information regardless of format, channel and location.

Information use – is how information is applied to accomplish a particular task

CHAPTER TWO:

LITERATURE REVIEW

2.1 Introduction

This chapter covers the theoretical framework on which the study was based and it also reviews previous studies that have been conducted and which have relevance to this study. The purpose of this was to bring out the strengths, weaknesses and significance to this study.

First, the researcher presents related theories that have been presented in literature with regard to information provision by various systems and a theoretical framework which informs the study is discussed in detail.

A review of literature then follows. Firstly, an overview of agriculture sector in Lower Yatta district; secondly, information needs of rural farmers and government initiatives in relation to agricultural support and information provision to farmers and thirdly, a review of ICTs in general and ICTs in this area are explored. Finally, a discussion on the role of ICTs in agricultural support is provided.

In conclusion, an analysis of reviewed literature is presented relating to what the various studies advocate for and therefore presenting the motivation behind this research.

2.2 Theoretical Framework

A framework is simply the structure of the idea or concept and how it is put together. A theoretical framework then is an essay that interrelate the theories involved in the question. It guides a research, determining what things to measure, and what statistical relationships to look for (Sekaran, 2001).

Various theories inform this study and they include:

2.2.1 Wilson's general Model of Information Behaviour

This model is one of the several (Dervin's 1983, Ingwersen's model 1984 and Prochnicka's model 1991) employed in research concerned with information use and users. It presents in a simplified way, the relationships among theoretical propositions and processes connected with identification and satisfying one's information needs. It employs a social perspective whereby information users are seen first of all as members of a particular community, social category or group, and for this study, the information users are the rural farmers.

According to Wilson's model, an information need is influenced by the context, which can be the person, or the role the person plays in work and life, or the environment. It argues that individual features form a unique personality and strongly determine information behaviour. In other words personal characteristics influence choice and hierarchy of information needs.

Intervening variables are factors which condition information behaviour. They can be personal, role-related or of environmental nature. Psychological variables are outlook on life and systems of values (knowledge, attitudes towards innovation,

preferences, and interests). Demographic variables include gender, age, social and economic status, education and job experience.

Wilson inserts a concept of activating mechanism between information need and decision to seek information. Wilson notes that not every need gives an incentive to undertake activities leading to seeking information. To find out what stimulates and motivates information seeking two theories are used – stress/coping theory and risk/reward theory.

About the modes of obtaining information, Wilson differentiates passive attention, passive search, active search and ongoing search. First mode means passive absorption of information from the environment, which is mostly used by farmers in the study area. The second mode applies to those occasions when a particular type of behaviour results in acquisition of information that happens to be relevant to the individual. The third, active search, takes place when a person actively seeks out information. The fourth means continuing search carried out to update or expand area of information.

Information obtained by a user is processed and becomes an item of person's knowledge and is used directly or indirectly to influence the environment and, as a result, create new information needs.

Diagrammatically the model is as shown in figure 1 below:

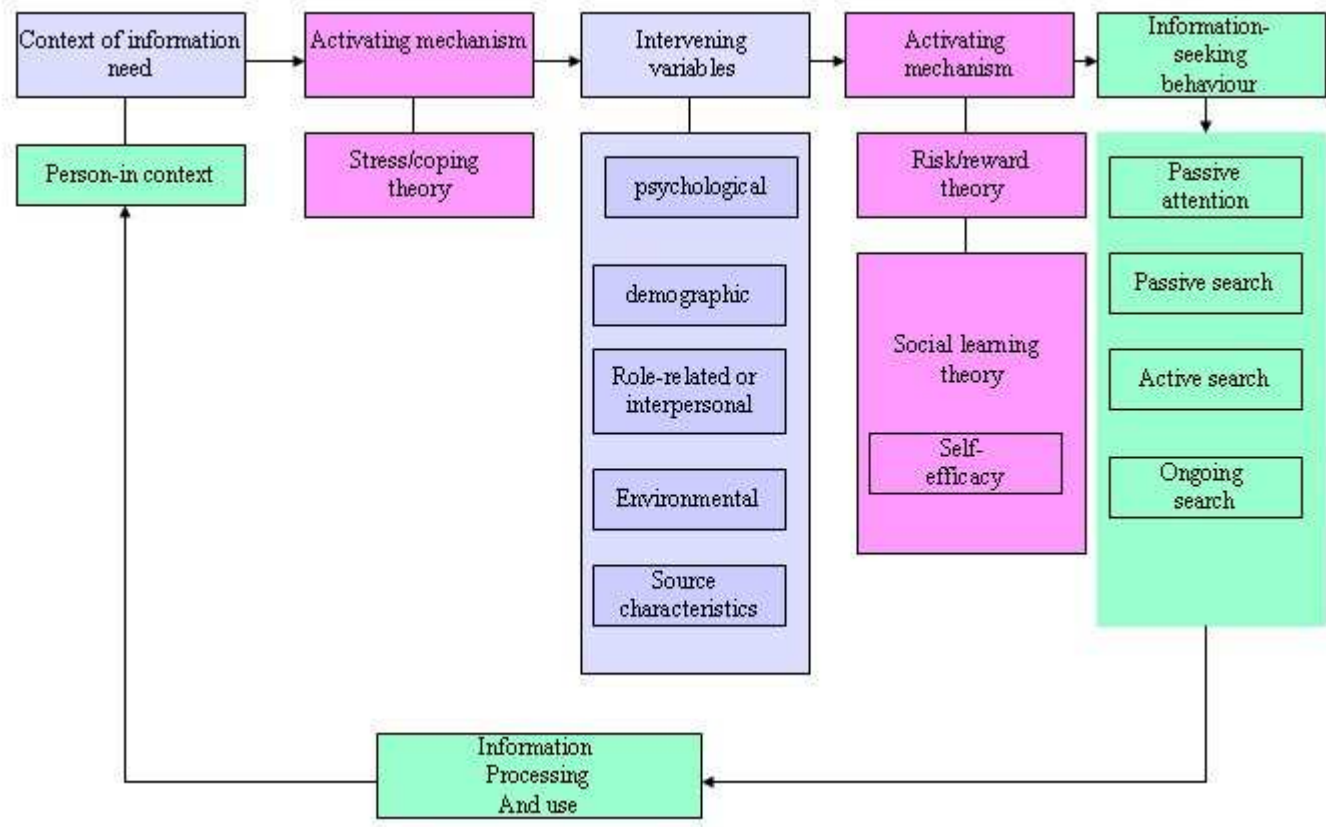

Figure 1: Wilson's general model of 1996. Source: Wilson, 1996

2.2.2 Info-Mobilization Theory

This study was also informed by info-mobilization theory. According to Kwake and Ocholla (2007), Info-mobilization is based on Sociotechnical systems theory (STS) which is an outgrowth of the general systems theory and its application to the design of information systems in organizational settings. Sociotechnical system theory claims that

separate efforts to optimize the technical system and the social system will lead to sub-optimal results, and can even be infeasible. It argues that an information system can be a success in one organization/community but a failure in another, while the same organization/community can experience success with one information system but fail with another. Hence, the information system and its context must be studied, understood, and managed together, not separately. Info-mobilization applies this theory to rural communities in developing countries, where they are seen to be more applicable than in commercial or government organizations because community actions are influenced more by social factors and individual choices than are organizational actions. Harris adds that work systems are most effective when technology systems and social systems are closely aligned.

In info-mobilization, the focus is on concurrent processes of technological and social change and on the joint optimization of human and technical processes within communities. Info-mobilization is an organic process of change in which collaborative groups explore and learn about problems and solutions in an iterative manner.

Info-mobilization confronts communities with their information requirements. It addresses the design, delivery and utilization of community information systems by;

- Defining community information requirements based on needs and priorities that have been expressed by the communities themselves, in this case, information needs of the community will be agricultural related.

- Igniting community aspirations and empowering communities with appropriate skills for fostering local development that is information-based, the rural farmers need to be enlightened on how they can take advantage of ICTs to access agricultural related information which can assist them in their production.
- Expanding a community's social capital through enhanced access to communication facilities and information resources, the policy makers in this area need to be aware of the state of communication facilities and the information resources available so as to know the loopholes and where to direct resources.
- Embedding community based ICT services within existing economic, governance and social structures, related to the previous point is that the ICT services should be people-driven.
- Infusing enhanced capability for information access within communities, this is to ensure that appropriate channels are used which can deliver the intended information.

2.2.3 Information innovation adoption model

Since this study is interested in investigating the factors that determine the use of ICT, it employs he information innovation adoption model to explain farmer ICT use behaviour. It is the best existing model that was found to explain ICT use in agriculture. The model uses behavioural modeling concepts proposed by Kline (1998) and uses mediating variables to assess the relationships. It was developed, adopted and used by Alvarez and Nuthall (2006) to investigate the use of computer based information systems by dairy farmers in Canterbury, New Zealand and Florida, Uruguay. They used this

model and modified it to develop an enhanced model for computerized system adoption. The model is shown diagrammatically in the figure below:

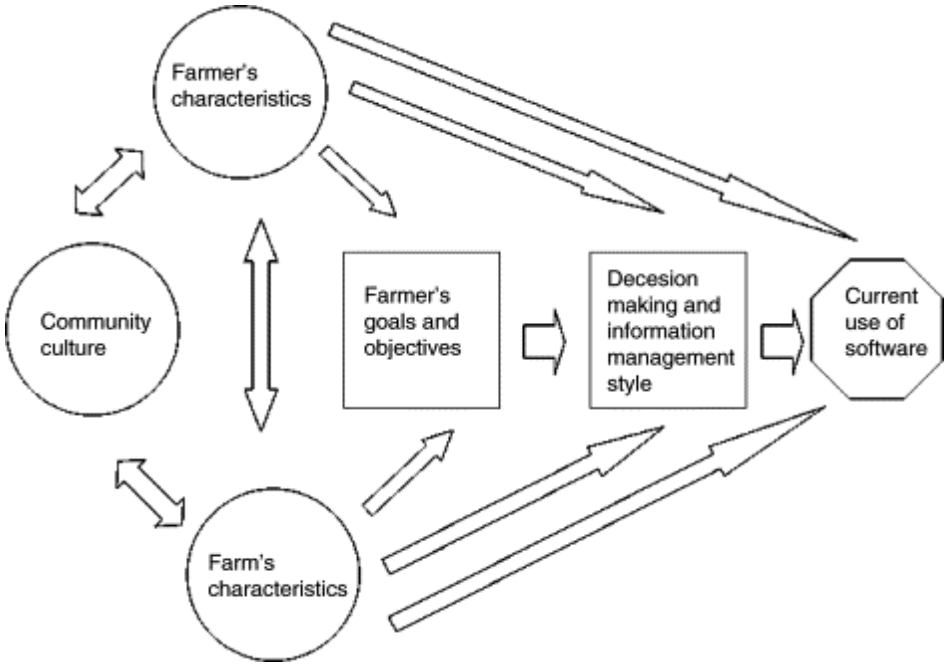

Figure 2: Information innovation adoption model
(Adapted from Alvarez & Nuthall, 2006)

The model shows that the use of computers by farmers relies on certain variables and that the relationship among the variables is not a simple direct one. The first group of variables is composed of antecedent variables that are indicated by circles in Figure 2. An antecedent variable is an underlying cause for a situation or scenario. In this model, the variables include farmer's permanent characteristics such as age, personality, formal education and income; farm characteristics such as farm size and crops grown on the farm, and community culture.

Community culture is the farming culture that involves the values, ideas, and principles that were shared by the farming community. The second group of variables includes

mediating variables indicated by rectangles in Figure 2. Mediating variables are variables that describe how, rather than when, effects will occur by accounting for the relationship between the independent and dependent variables. Mediating variables are introduced to explain why an antecedent variable affects the outcome variable. Examples are coping styles of farmers, use of ICT in decision-making, information management style, and objectives and goals pertaining to ICT. The inclusion of mediating variables like personality traits, learning styles and farmer's goals provide a more comprehensive explanation and better understanding of information management behaviour.

According to Alvarez and Nuthall (2006), the model assumes that there are direct and indirect relationships between the antecedent and outcome variables. The reversible arrows on the antecedent variables indicate a two-way relationship between the variables. One variable may affect the other either positively or negatively and vice versa. For example, education, as an independent variable, may not be acting alone, but interacting with farm characteristics and/or with elements of community culture. One-way arrows indicate the relationship between the antecedent and the mediating variables, with the mediating variables explaining the relationship between the antecedent variables and the final outcome variable. Each antecedent variable may affect the mediating variable negatively or positively, for example the farmer's education may affect the farmer's objective, management style and the ultimate use of ICT.

All these variables influence the final outcome variable, which is the use of ICT represented by the octagon in Figure 2. Basically all these three groups of variables are being investigated in this study. In the data collection instrument there are relevant questions asked about these variables.

2.3 Application to the current study

From the theories used to inform this study, it is clear that information needs are influenced by the context of the user. In relation to rural farmers, their information needs are determined mainly by the work they do and the surrounding environment. Intervening variables, which are factors that influence the information behaviour of a person. Variables like educational level, gender, and age can have an influence on information access and use. In regard to modes of obtaining information, it was established through this study that farmers in this area mostly obtain information through passive absorption. This is where they get the information when they are listening to news or another programme, but their main intention of using the ICTs is not to access agricultural information. When they get this information and they apply it in their agricultural activities, the urge to know more and more is realized and therefore access to this kind of information creates new information needs.

According to info-mobilization theory, for an information system to succeed, the social context of where it will be applied has to be studied and therefore its design has to take into consideration the context. This is true for this study, since not all ICTs can be successfully used to deliver information to rural farmers in this area. The ICTs to be used have to take into consideration the physical and information infrastructure in this area and also the characteristics of the farmers in terms of level of education and economic levels. Information requirements are based on needs of the community, Wilson’s model also stresses this point.

Information innovation model fits well with this study in that it focuses on adoption of ICTs specifically in the agriculture sector. Various variables which affect in one way or another the adoption of ICTs are the prevailing characteristics of the rural farmer and therefore affect the the way farmer will use ICTs.

2.4 Agriculture in Lower Yatta District

Lower Yatta is a rural district in the larger Kitui district with rain-fed agriculture providing for livelihoods in the district. According to a Kenya National Mapping report (2004), the climate of Lower Yatta District is arid and semi arid with erratic and unreliable rainfall. Most areas in this district are generally hot and dry leading to high rate of evaporation. This combined with unreliable rainfall limits intensive and any meaningful land use and related development activities.

The annual rainfall ranges between 500-1050mm with 40 percent reliability. In years of below average rainfall (i.e. below 300mm), crop yields are poor to non-existent and livestock development has been negatively impacted. Inadequate, erratic and unreliable rainfall has led to 80% of the population in this region to be food insecure due to frequent crop failures. This area has two rain seasons; the long rains come in April-May and short rains in November-December. Due to the limited rainfall received, surface water sources are very scarce. The major sources of surface water are seasonal rivers that form during the rainy seasons and dry up immediately after the rain. Athi River is the only perennial river in the district and flows along the border with Machakos district serving a large population and hence it cannot support irrigation.

2.5 Information Needs of Rural Farmers

"Information support system to rural farmers is a prerequisite for sustainable agricultural development" (Metei & Devi, 2009, p. 35). Rural farmers require various types of information for their day-to-day agricultural activities. For instance, in a country like Kenya which is an agro-based economy, rural development brought about by agricultural production can play a great role in national development. Therefore, quick and easy access to relevant information is vital for the development of rural areas.

Farmers in a farming community can be classified into three categories as small scale, medium scale and large scale farmers depending on the size of the farm possessed and this determines the level of output, a key determinant on poverty level. Also they can be classified as literate and illiterate farmers. Literate farmers may be provided with agricultural information through training, print or electronic media, but in the case of illiterate farmers, they can only be educated by use of audio-visuals and demonstration methods. These are some of the factors highlighted in the info-mobilization theory which determine the success of a particular information system in a community.

According to Metei and Devi (2009), information needs of farmers may be divided into six groups:

1. Field acquisition: farmers are required to know the different types of schemes and subsidies in purchasing of land.

2. Agricultural inputs: farmers need information about improved variety of seeds, pesticides, agricultural equipment, weather conditions, harvest and post harvest technology.
3. Agricultural technology: farmers need to be fed with information about innovative technology in their farming.
4. Agricultural credit: farmers need information about credit facilities, terms of loans available to them.
5. Agricultural marketing: day to day marketing trend on price of different variety of crops are necessary for the farmers.
6. Food technology: information on post harvest food technology is needed by the farmers to get optimum benefit out of their crop.

2.6 Application and use of ICTs in provision of agricultural information

ICTs can be categorized based on how long they have been in common use, and to some extent the technology used for the transmission and storage of information.

Emerging ICTs

Computers, satellites, wireless one-on-one communications (including mobile phones), the internet, e-mail and multimedia generally fall into the new ICT category. The concepts behind these technologies are not particularly new, but the common and inexpensive use of them is what makes them new. Most of these, and virtually all new versions of them, are based on digital communications.

Conventional ICTs

Radio, television, land-line telephones and telegraph fall under old ICT category. They have been in common use throughout much of the world for many decades. Traditionally,

these technologies have used analog transmission techniques, although they too are migrating to the now less expensive digital format.

2.6.1 ICTs in Lower Yatta District

A number of shopping centers are linked to the telephone network manually operated exchanges. There are a few newspaper bureaus based in Kitui Town, which gather, process and disseminate political, social and economic development information. The newspapers that circulate in Kitui District include Daily Nation, Kenya times, People, and The Standard among others, but only a few copies of Daily Nation and The Standard reach Yatta shopping centre where the rural farmers can access. The district is also covered with television and Radio networks. According to Kenya National Mapping (2004), 1 out of 381 households in the area have access to television sets. However, 9 out of 10 households have radio systems. The Mobile telephone networks available in the area are Safaricom, Zain and Orange. However, only a few people can afford the handsets. Internet and e-mail services can only be accessed from a few cybercafés in Kitui Town.

2.6.2 Role of ICTs in Agricultural Support

According to a research carried out in Manipur state in India by Metei and Devi (2009), information support to rural farmers is vital and majority of them do not have access to the required agricultural information and therefore application of ICTs based agricultural information support systems is important for the dissemination of agricultural information and technological know-how to rural farmers. For instance, Bob (2008) found out that mobile phones are being used to diagnose and treat crop diseases that

cause massive losses to farmers in Uganda. Here community knowledge workers send text messages to farmers in a given locality about disease threats, where to buy uncontaminated seeds, as well as tips on how to improve soil quality to increase yields.

ICT in agriculture is an emerging field focusing on the enhancement of agricultural development. It involves application of innovative ways to use ICT in the rural domain. The ICTs can be utilized to provide accurate, timely, relevant information and services to farmers, thereby facilitating an environment of productive agriculture.

Major benefits have emanated from using ICT in agriculture including precision agriculture, efficient information dissemination among others. These benefits are discussed in more detail in the following section;

Precision agriculture

This is information and technology-based agricultural management system that identifies, analyses and manages site-specific spatial and temporal soil variability within a field for optimum yield, profitability, sustainability and protection of the environment (Rilwan & Ikhuoria, 2006). Technologies used in precision farming allow farmers to vary inputs such as fertilizers, pesticides and seeds in fields based on management zones.

To some extent precision farming is being practiced in Kenya through a KEPHIS initiative where a farmer can send an SMS to a certain code to get the soil type the locality and also can get information on the seed variety best suited to that soil type.

Agricultural extension

ICT is now being used in agricultural extension to disseminate expert advice to farmers. Various ICT applications have been developed to assist in this. For example, mKilimo which is a unique and innovative service aimed at providing agricultural

information, advice and support over the phone to smallholder farmers. It provides a two-way communication channel between farmers and agricultural experts and provides a reliable solution to the information deficit that farmers often face.

Information dissemination

Emerging ICTs enable farmers, service providers and intermediary agencies working with farmers to exchange ideas, transmit data, access and disseminate information. Various initiatives have been developed, for instance mFarm which is a technology-based application where farmers can access and exchange information on market prices of agricultural produce.

E-commerce

ICTs have been used to build agribusiness information management and payment systems. mFarm is a good example which provides price updates and market information to agriculturalists, consumers. MPESA is another application whereby farmers are using it to transact various businesses regardless of location.

A number of possible areas where ICT is used in agriculture have been discussed in this section. However the use of modern technologies such as internet and other computerized systems still face a lot of challenges in developing countries.

2.7 Barriers inhibiting ICT use by rural farmers

Despite efforts by farmers to apply ICT in their farming practices, majority of rural farmers have no or limited access to modern tools thereby highlighting the digital divide that not only exists between different continents and countries, but also provinces and even between local agricultural communities within the same country. ICT use levels of the developed countries remain higher than those in developing countries. This may be

because of some constraints that inhibit people in developing countries from using ICT. These constraints include: (i) poor technological infrastructure (ii) Lack of ICT access (iii) High cost of access to ICT (iv) Lack of ICT awareness and training (v) Language and content limitations (Mutula, 2005). These constraints are discussed in detail below:

Poor technological infrastructure

Technological infrastructure encompasses technological tools, methods and access models that are used to facilitate the efficient management and transfer of information. Lack of adequate technological infrastructure has remained a major inhibiting obstacle to the use of ICT in most developing countries. According to Guermazi and Satola (2005), the infrastructure investment needed for the uptake of ICT far exceeds the resources of most developing countries and is prohibitively expensive or not commercially viable. Jorge (2002) noted that telecommunications infrastructure is limited in most developing countries and costs are exceedingly high. The limited available infrastructure is mostly found in larger urban areas, thereby neglecting and depriving the rest of the individual farmers and firms in rural areas – those in need of a steady flow and ready access to information. This situation is not favorable since the majority of the world's poorest people dwell in the rural and poor areas, where there is little or no ICT infrastructure.

Problems of connectivity and poor network coverage have been a major setback facing most developing countries since the early 1990s (Langmia, 2006). Mobile technology is playing an important role of reducing the digital divide and improving ICT access in rural areas where only wireless systems are being used due to lack of communication infrastructure (Cullen, 2001). The identified contributing factors affecting the

development of technological infrastructure in Africa include among other things, telecommunication monopoly by government and obsolete regulatory framework, inadequate coordination of physical infrastructure connections and poor availability of indigenous information via networks causing a high dependence on Western countries. This is evident in most African countries especially the monopoly ownership of telecommunication companies which are not allowed to be privately owned.

Lack of ICT access

In this era where information is considered the fundamental basis of socio-economic activities of any economy, it is unfortunate that not everyone is participating fully in the information society (Kabede, 2004). This result in a digital divide which hinders those without access to ICT from playing an active role and become beneficiaries of the information society. Marker, *et al*. (2002) noted that poor people do not have access to information, knowledge and communication. This is because access to ICT is highly dependent on telecommunications infrastructure. Therefore, without infrastructure, there is no access to ICT. Ensuring access for all to ICT is still a great challenge to most of the developing countries. The inaccessibility of ICT makes it difficult to share information across traditional barriers and to give a voice to traditionally unheard people.

In rural areas of developing countries, the use of ICT to connect sources of agricultural innovation to end-users especially farmers is limited by lack of Internet connectivity. The majority populations depend mainly on radio, television and newspapers as the widest form of communication (Kenny, 2002). Raju (2004) acknowledged that traditional media

like radios, videos, televisions, slides, pictures, exhibitions and field demonstrations have been used to speed up information flow in rural areas within developing countries.

High cost of ICT

According to Jorge (2002), even when infrastructure is available, affordable access is a concern in most developing countries. ICTs are expensive and unaffordable to the majority of developing countries inhabitants, even for middleclass families, thereby cutting down the populations who are able to use the technology. The initial costs of ICT and the ongoing expenses of maintaining them are very high and a number of people cannot afford them. Among the main obstacles affecting ICT diffusion is the price that is charged to end- users by ICT service providers for ICT access.

Lack of ICT awareness and training

With the greatest percentage of illiterate people in developing countries, ICT face a tremendous challenge to be effectively used by the communities. Most developing countries are in the bottom rank on literacy. According to Ifinedo (2005) all countries in Sub-Saharan Africa with the exception of South Africa and its neighbours have a poor e-readiness score. This is evidenced by the fact that, there is a general lack of community awareness about the potential benefits and capabilities of ICT (Colle & Roman, 2003). Without a high level of ICT awareness, no community can fully participate in this networked world. Gelb and Parker (2005) noted a critical need for ICT training for end users to cater for the ever-changing information and Internet characteristics, which can be provided by extension officers, scientists and consultants. ICT training is of utmost importance for people in agricultural communities for their empowerment. Involvement

of local people in deciding the key technologies for communities to use is also a critical issue, because without the necessary training and awareness, people will not be empowered.

Language and content limitations

In most developing countries, a major barrier in the use of ICT for economic development is the lack of local and community related content as well as content in local languages. Mutula (2005) noted that Sub-Saharan Africa faces a problem of inadequate locally owned, published and adapted knowledge and content to satisfy the needs of its people. Most of the content on the web is not relevant to the indigenous people of Sub-Saharan Africa. Therefore, there is need for digital information content that is relevant to the communities in Sub-Saharan Africa, to cater for the needs and requirements of different consumers and communities (Kavulya, 2007). ICT can only be useful and meaningful to support people-centered participatory development; particularly to the rural and poor if only relevant information and content is provided to address their local demands and needs. Content in local language is very important if ICT are to make a difference in people's lives.

The poor in most developing countries demand access to locally-contextualised information, more than existing information from an alien context (Cecchini & Scott, 2003).

Even to those who have ICT access, a significant barrier remains the language and content limitations. Languages spoken by millions of people are absent from the Internet. Actually, English, a language spoken by a few of the world's poorest people, remains the

dominant language of the web (Kenny, 2002). As a result, English speakers are more likely to use ICT such as the Internet more than the non-English speakers. In order to overcome the limitations posed by language and content, there is need for translation from English to local languages.

To solve this issue of irrelevant content, Gebremichael and Jackson (2006) calls for the need for a holistic approach in carrying out an in-depth analysis of the content, training and greater relevance of ICT to the needs of the local people.

2.8 Government Initiatives in Information Provision

The Kenyan government through the Ministry of Agriculture and its stakeholders have come up with various initiatives and interventions touching on the agricultural sector. As noted by Songa (2010), "the government has given priority in the revitalization of the sector through reviewing various policies and legal frameworks to create a conducive environment for private sector participation". Some of the programmes in this area include; construction of Kitui Agricultural Training Centre, and Annual district farmer's field day.

Another significant policy by the government is the District Agricultural Development Plans (DADPs) which are implemented in all districts in the country. This component focuses on the local agricultural investments (such as rural infrastructure, agricultural inputs, and equipment), local agricultural services (research and extension services), and local agricultural capacity building and reform (Ministry of Agriculture, 2008).

Kenya Plant Health Inspectorate Services, one of the state corporation under Ministry of Agriculture has come up with various initiatives to provide farmers with information so as to increase their output. For instance, to help farmers, it has together with some seed companies such as the Kenya Seed Company launched an information service. Farmers can use their mobile phones to get information on which seed varieties can do well in various agro-ecological zones in the country. Farmers can access this information using the following steps:

Kenya Seed Company varieties: On Messages Menu, Write the word MAIZE* DIVISION, then send to 3000. One will get a reply on varieties suitable to that division, their qualities and how long they take to mature. Farmers can also call the company on Telephone numbers 0716 647 693 or 0733 854 713.

KEPHIS Information Service: Write the message: Maize*Name of the division, SMS to 2964 using Safaricom, Zain or Telkom lines. If one cannot get the information he/she needs, one can call KEPHIS personnel on Tel. 0722 516 221 or 0733 874 274.

Identifying Genuine Seed Sellers:

KEPHIS recommends the following procedure for identifying genuine seed sellers.

Before Buying Seed;

1) Ask the seed seller for his/her Kephis Seed Seller Id. Number

2) Send the Seed Seller Id. Number To **5354**

3) One will receive a confirmation on whether the seed seller is duly licensed by Kephis.

For example if the seed sellers ID number is 100001, go to the messages function on the phone, type in 100001 then send to 5354. One will receive an SMS from KEPHIS confirming the seed sellers status.

Although these are good initiatives aimed at helping the farmer access agricultural information, mechanisms have not been put in place to ensure they get the information and use it.

2.9 Summary

From the literature reviewed, it was clear that ICTs are playing a major role in almost all aspects of life and rapidly transforming the way people do things including access to information. It was also argued that knowledge and information are basic ingredients of food security and are essential for facilitating rural development and bringing about social and economic change. Rural farmers require information inter alia on supply of inputs, new technologies, early warning systems (drought, pests, and diseases), credit, market prices and their competitors.

CHAPTER THREE:

RESEARCH METHODOLOGY

3.1 Introduction

This research aimed at investigating the role of ICTs with regard to information access and use in Lower Yatta District. Saravanavel (1992, p. 73) defines methodology as "…methods comprising the procedures used for generating, collecting and evaluating data". It is a way to systematically solve the research problem. According to Khanzode (2007, p. 26), "methodology generally denotes a combination of a) 'technology' of data collection, namely tools and methods of research such as the questionnaire, interview, case study, survey and participant observation methods and content analysis; b) analytical tools such as statistical tests and methods". This shows the various steps that are generally adopted by a researcher in studying a research problem. This chapter focuses on the methodological procedures that were used in the study and the description of the methods applied when carrying out the research. It covers research approach and method, sample design procedures, data collection instruments, data collection procedures, data analysis techniques and ethical issues considered when carrying out the research.

3.2 Research Approach

According to Dalcher and Brodie (2007, p. 65), the choice of a research approach is coupled to the type(s) of data available to the researcher. The appropriate approach in a research will depend on the objectives of the research, the research questions set and on the nature of study within a specific context.

The study employed a qualitative research approach. Qualitative research includes designs, techniques and measures that do not produce discrete numerical data. Data in this design are in form of words rather than numbers which are grouped into categories. This method was preferred because it is used to explore and understand people's beliefs, experiences, attitudes, behaviour and interactions. The study was investigating the use of ICTs in information access and use and therefore used a qualitative research because the researcher needed to visit the rural farmers, talk to them and observe the situation on the ground so as to gather information about the farmer's experiences and opinions about access and use of ICTs for provision of agricultural related information.

3.3 Research Paradigm

A survey research was used to gather information related to the main problem. A survey is a research method used for gathering data through the measurement of some items or through solicitation from other people or documents (Koul 1990). It involves the systematic collection of data on an entity or a group of entities or operations and drawing conclusions from what the data shows. The method has the advantage of giving more in-depth investigation and it also allows for the studying of both large and small populations (Silverman 2005). According to Fowler (2009), survey research is best suited when a large population is involved and covering a large geographic region. This method was deemed necessary for this study because surveys are used to collect information from or about people to describing, comparing or explaining their knowledge, feelings, values, and behavior, which was what this study purposed to do. According to Fink (2009), there are two types of survey methods. These are descriptive and analytical survey methods. This study used descriptive survey method.

Descriptive survey method

The basic purposes of descriptive survey are to describe characteristics of the population being studied, estimate proportions in the population, make specific predictions, and test associational relationships (Fink 2009). This design was preferred because the objective of the study was to answer questions concerning the current status of poverty, ICT use and information use among the rural farmers in this district.

3.4 Study Population

A research population is the entire set of individuals about which inference will be made (Pickard, 2007). It is a group of respondents, objects or items from which samples are taken for measurement (Kombo and Tromp 2006). The study population comprised of rural farmers from Lower Yatta District. According to Kitui District Development Plan 2002-2008, Lower Yatta District has a population size of approximately 10,000 people. Majority of the population in this area are farmers, either small scale or large scale and therefore they formed the study population.

3.5 Sampling

According to Dalcher and Brodie (2007, p. 73), sampling occurs when a researcher collects a subset (sample) of the total population of data that exists. Sampling was appropriate because of the large population and it was not possible to collect data from everyone in the population.

3.5.1 Sampling Procedure

According to Kombo and Tromp (2006), sampling procedure refers to the technique or design the researcher adopts in selecting items for the sample. It is the process of laying down the number of items to be included in the sample, for instance, the size of the sample. Stratified sampling was used to draw the sample. The basis of the strata was location; Yatta, Kwavonza, Kanyongonyo, Kanyangi, Nthongoni, and Kiseuni.

Purposive sampling was used in selecting the specific farmers. In this case, a certain number of farmers from the six locations were selected. In purposive sampling, respondents were selected depending on the researcher's judgment as to who could provide the best information to achieve the objectives of the study (Kumar 2005). Here the researcher only collected data from those people who in her opinion were likely to give the required information and willing to share it.

Similarly, the key informants were purposively selected based on their position in the community under study and subsequently their expected knowledge or awareness of the subject or their ability to influence decision making.

Table 1: Distribution of key informants

Key informants	**Population**	**Sample**
District Agricultural Officers	1	1
Ministry of Agriculture – Officers	2	2
Chiefs	6	6
Local Media Representatives	2	2
Community Based Organization Programme Managers	2	2

Agricultural Extension Officers	3	3
Total	**16**	**16**

As shown in table 1 above, they included 1 District agricultural Officer, 2 Officers from the Ministry of agriculture, 6 chiefs (one chief per location), 2 local media stations representatives (the head of programmes), 2 programme managers of two community based NGOs in the locality, and 3 extension workers. Since the Ministry of Agriculture officers are policy makers, they provided information about the policies they had put in place and what policies they were going to put in place to enable farmers access information which could help in increasing their production. The Chiefs, NGOs programme managers, and the extension workers were important because they interact with the rural farmers in their work life and were better placed to know their experiences, needs and problems as it relates to access to ICTs and information. The area has three media stations which broadcast in the local language and this was appropriate because of the literacy levels, the stations provided information on the programmes they aired and they intended to air to provide information about agricultural practices to farmers.

3.5.2 Sample Size

Mugenda (2003) defines a sample as “a subset of a particular population selected for observation and analysis”. There are no rules for sample size in qualitative inquiry. “The validity, meaningfulness, and insights generated from qualitative inquiry have more to do with the information richness of the cases selected and the observational/analytical capabilities of the researcher than with the sample size” (Pickard 2007). Pickard (2007, p. 67) adds that, in qualitative research, one does not require a large number of respondents

provided one gets a good representation of all the aspects being studied. Following this principle, sixty one people became subjects of the study. The researcher collected sufficient data to make a valid conclusion or generalization about the population.

3.6 Techniques for data collection

The techniques which were used to collect data for this study included: face to face interviews, observation methods and document analysis.

i. Face to face interviews

The researcher used this technique to get information from both rural farmers and the key informants. Interviews were chosen as the main data collection technique for this study for three main reasons. One is because of the kind of data to be collected which was in-depth in nature and because of the interactive sessions with the respondents they were able to offer substantive input directly; secondly, interviews provided an opportunity to collect primary data from the farmers about their experiences, feelings and opinions on the use of ICTs for provision of information and finally the response rate of interviews is much higher than other techniques (Neuman, 1997).

Additionally, this technique was appropriate because of the low literacy levels of the population who required the researcher to translate the questions posed to them and also expound on what was being asked. If a respondent did not understand a question it was paraphrased to suit their need. The researcher collected data directly and personally from the respondents. It was also appropriate because immediate verbal responses of the respondents were obtained which were valuable and gave original data. Whenever

necessary, respondents were probed and clarification of responses sort. As a result, the research managed to collect detailed in-depth descriptions of the phenomena under study.

The interviews were guided by interview schedules (See Appendix A and B). The interview schedules were forms from which questions to be asked during the interview were listed and asked in the same order as they appeared on the schedule. Information collected was on the following categories; personal information of the respondents, information needs, information access and ICT access and use.

The Interview Procedure

The researcher took in-depth interviews with the rural farmers, on average, each interview took 25 to 30 minutes. The respondents (rural farmers) were so cooperative that they were interested to spend more time. Enough copies of the interview schedules were printed, which the researcher used to ask questions from the respondents, then noted down the responses on each question. Some responses were in the respondent's mother tongue and the researcher had to translate them when noting the points. The same was also done for the key informants.

The face to face interview method proved to be the best to be used in this study because it helped in acquiring information on the respondents' experiences, opinions, and attitudes. Interview data consisted of verbatim quotations with sufficient content to be interpretable.

The researcher was able to do some data analysis in the process of data collection, because certain key themes emanated during the process. Since the responses were being noted down, it was possible for the researcher to determine the frequency of certain responses and this helped in the determination of point of saturation.

Recording the interview

Note taking method was used to record data during the study. Mugenda and Mugenda (1999) recommend that the interviewer should record the respondent's answers exactly as expressed and that attempts should be made to summarize, paraphrase or correct bad grammar. In pursuance of this recommendation, the researcher recorded the responses on the interview schedule paper which was being used as a guide, as the participant responded during the interview. In addition, some interpretive comments were made on the margin. The non-verbal behaviour was observed and it helped the researcher to verify interviewee's claims and provided an opportunity to probe the respondents further. Slater (1990) supports this, “a good qualitative interviewer should always be alert to visual evidence and sensitive to body language as a two – way communication process”. Using this approach, the researcher was able to obtain satisfactory and complete responses as well as supplementary information that was not included in the interview schedule, but was found relevant to the study.

ii. Observation

Detailed observations were made during field visits and throughout the data collection period. The researcher was able to observe and understand issues raised by the respondents. For instance, it was possible to observe the presence of ICT infrastructure, ICT presence, and farm size.

iii. Document Analysis

Data on ICT use in agriculture was obtained from relevant sources of information, such as publications, journals, relevant websites and books. Different government sources were consulted for information. These included handbooks, policy statements, published statistics, national government sources, planning documents, reports, historical and other official documents – these were found in the District Officers office. This was a good method to map and audit the types of ICTs available and also to get an overview about the district.

Pickard (2007, p. 45), promoted the concept of triangulation; that every method has its limitations, and therefore multiple methods are usually needed. Triangulation strengthens a study by combining methods, data, and theory. Studies that depend on only one method are more vulnerable to errors linked to that particular method. This resulted

in the mix of data collecting methods in this research – observation, interviewing and document analysis.

3.7 Validity and Reliability of Research Instruments

Reliability

Mugenda (2003) defines reliability as “the measure of the degree to which a research instrument yields consistent results or data after repeated trials”. If the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable. For reliability, the researcher using a well designed research instrument asked the same question to members of the same family and compared the responses to see if they gave consistent results. Also the researcher ensured reliability by asking the same question but framed differently to the same respondent to see if it captured the same response.

Validity

Validity can be defined as the degree to which an instrument measures what it is supposed to measure, it is the strength of the conclusions, inferences and propositions. In otherwords, validity is the degree to which results obtained from the analysis of the data actually represents the phenomenon under study. Validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are.

For validity, the researcher came up with an interview schedule that had listed systematically questions pertaining to all that the researcher wanted to find out during the research, that is the schedules and the questions were in line with the research objectives, and research questions. Also from literature review, the researcher was able to identify the kind of questions asked during the various empirical researches conducted and the kind of responses they enlisted and this helped in coming up with the questions (Lwoga, 2008, Chilimo, 2006, Duncombe & Heeks, 2001).

Other ways the researcher used to ensure reliability and validity of data were:

Triangulation

This was done by combining interviews and observations methods in data collection. This enabled the researcher get first hand information and a better understanding of the use of the ICTs and their availability rather than asking questions only. The researcher was in a position to observe and justify some responses got from the interviewees.

Pilot study

A pilot study refers to a small study conducted in advance of a planned project, specifically to test aspects of the research design and to allow necessary adjustments before final commitment to the design. The research instruments were pre-tested in order to check vocabulary, language level and how well the questions were understood.

A pilot study was carried out on six farmers, one from each location. The results of the pilot study helped in eliminating ambiguity in some questions and in fine tuning the questions. See Appendix B vis a vis Appendix D

3.8 Data Presentation, Analysis and Interpretation

Data collected was in form of text, written words, phrases describing or representing people's actions, and events in their life. It was not easy to analyze qualitative data because there are no clear set of conventions for analyzing qualitative data. In qualitative research data collection, coding and analysis occur immediately, concurrently and throughout. Coding consisted of naming and categorizing data.

After the required data was received from the field, preliminary manipulation of it was considered using Miles and Huberman's (1994) framework of qualitative data analysis; data reduction, data display and conclusion drawing and verification. This was useful not only to ensure manageability of the vast amounts of data collected, but also to enable in choosing which aspects of the data would be emphasized or minimized during analysis. Data was analyzed using content analysis; it was coded and organized into themes and concepts which were used to formulate theories, conclusions and generalizations.

The Miles and Huberman's framework of qualitative data analysis was applied as discussed below:

Data reduction

Miles and Huberman (1994) describe this first step of qualitative data analysis as data reduction. "Data reduction refers to the process of selecting, focusing, simplifying, abstracting, and transforming the data that appear in written up field notes or transcriptions." Not only do the data need to be condensed for the sake of manageability, they also have to be transformed so they can be made intelligible in terms of the issues

being addressed. Data collected was in form of interview notes; they were edited and cleaned up as relevant data was being extracted from irrelevant ones. This helped the researcher to determine which aspects from the collected data are to be emphasized and the ones to be minimized.

Data display

After data reduction, data was organized and compressed to permit conclusion drawing; this allowed the researcher to discern systematic patterns and interrelationships. Here subthemes emerged in addition to the main themes which came up during data reduction.

Conclusion drawing and verification

This is the third step in qualitative analysis using Miles and Huberman's framework. Conclusion drawing involved considering the analyzed data and assessing it with the questions in the research instrument. Verification entailed revisiting the data as many times as necessary to cross-check the emergent conclusions.

Data from the two sets of respondents (rural farmers and key informants) was analyzed concurrently. This data was analyzed in the major key themes of information needs, sources, and ICT use. Subthemes of these were also included as they emerged. All analysis was guided by the objectives of the study where each objective derived a variable that formed a theme for analysis.

Presentation was in the form of graphs, charts and tables to represent the various themes derived from the analysis. From the organized, analyzed and presented data, the researcher was able to make statements and draw conclusions.

3.9 Ethical Considerations

Social research is a dynamic process that involves respondents and researchers, to this effect a research permit was obtained from the National Council of Science and Technology (NCST). As a matter of principle ethical issues were considered when conducting this research. Some respondents were not willing to reveal some information that they regarded confidential to them. To ensure this did not affect the results of the findings, the researcher assured respondent's information confidentiality.

During data analysis, the researcher maintained integrity by presenting findings and interpretations honestly and objectively. According to Sarantakos (2005), there are eight elements a researcher must follow to do faithful and thorough work. These are: accuracy in data collection and processing, use of appropriate research methodology, appropriate interpretation of the data, accurate reporting, non-fabrication and non-falsification of data (p. 18). The researcher attempted to the best of her knowledge and capability to adhere to these principles.

Informed consent: the researcher observed this by ensuring that, a clear explanation was given to correspondents as to why the research was being carried out and how valuable this research was to him/her.

Anonymity: the researcher ensured that the respondents remained anonymous. Use of names was avoided. The respondents' confidentiality was observed at all costs.

Plagiarism: the researcher ensured that any information used from other sources was acknowledged and fairly used.

CHAPTER FOUR:

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents an analysis of data collected from rural farmers and certain key informants from Lower Yatta district. The collected data was presented, analysed and interpreted in line with the study's purpose which is to investigate the role of ICTs in information provision to rural farmers in Lower Yatta District.

A total of 51 rural farmers were interviewed. Out of these, 30 were crop farmers, 15 were cattle keepers and 6 were bee keepers. On the other hand, a total of 9 out of 16 key informants were interviewed. This represents (56%) of the expected responses. Gaining access to some key informants proved difficult due to their busy schedules, hence the above response rate.

Respondents were interviewed until a point of saturation reached where no new ideas were being given. More crop farmers were interviewed because they had diversity in their practice and therefore this gave more information than the other farmers who almost did the same thing and therefore their point of saturation reached earlier than that of the crop farmers.

4.1.1 Procedure for organising data

In order to organise and categorise the data obtained through the interview schedule, the following procedure was used:

- The completed transcripts were analysed according to selective coding. From this coding, categories were developed that reflect on the responses from the respondents.
- According to selective coding, six categories were identified, as discussed in the paragraph below.
- Data was analysed and findings interpreted.

In the following section, the responses are presented under the following categories: personal information, information needs, information sources, information access, access and use of ICTs and government initiatives and policies put in place for ICT usage enhancement. The categories are arranged according to the sequence of questions in the interview schedule. Under each category, data are analysed and interpreted.

4.2 Profile of respondents

The first set of five questions asked the rural farmers to provide their personal information. Various studies have indicated that certain factors like educational, demographic, personal have an effect on information access and use of ICTs, importance attached to information and information seeking behaviour (Lwoga, 2010, p. 87; Wilson, 1996, p. 113). The total sample of farmers who participated was 51 rural farmers (33 male, 18 female). Majority of the respondents were between 18 to 29 years. Most

respondents (96%; 49) had some level of education. Among those with formal education, male respondents (65%; 23) dominated the college level and above as compared to female farmers. The respondents were asked to indicate the level of education attained. Education is one of the social factors which can affect the use of information and ICTs (Lwoga, 2010, p. 116). Also, understanding of information requires a certain level of education. The importance attached to information is also commensurate with education level. The higher the education level, the more one is likely to value information (Chalmers, 1995, p. 56). Poverty results from lack of education and lack of income (World Bank, 2001).

4.2.1 Distribution of Respondents per Location

Data was collected from the rural farmers in six locations of Lower Yatta District.

Table 2. Distribution of Respondents per Location

Location	**No.**	**%**
Yatta	15	29.4
Kwavonza	12	23.5
Kanyongonyo	8	15.6
Nthongoni	6	11.9
Kiseuni	5	9.8
Kanyangi	5	9.8

Yatta location was the first to be visited because it was easily accessible by road. Most of the respondents (29.4%) interviewed were from this location, and since it was the first one the researcher visited. In Kwavonza location 23.5% of the respondents were interviewed, and this location presented varied information compared to Yatta, probably because it is near Kitui Town and also it includes a number of research institutes and

universities. The other four locations were similar in many features like poor road network, dry areas, poor mobile phone network connectivity, and lack of electricity. Point of saturation in these locations reached earlier than in the other two and therefore only a few respondents were interviewed as compared to Yatta and Kwavonza locations.

4.2.2 Farming practice

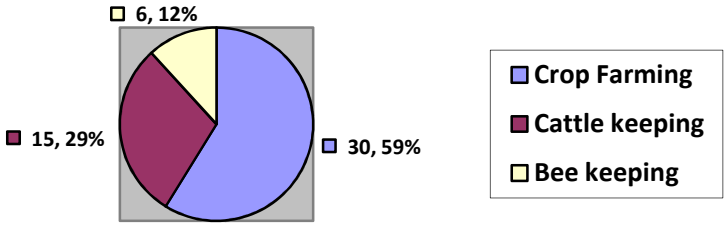

Figure 3*:* Distribution of respondents in terms of farming activity

From the figure above most of the farmers interviewed (59%) in this district practice crop farming. 29% are involved in cattle rearing while 12% practise bee keeping. Crop farming is the most practised because this is as old as the agrarian revolution and therefore people take it as one of the core farming activities which they cannot do without. Also it does not require much of the human activities unlike the other two farming activities. All the three farming activities are prone to weather changes but bee keeping has a lower risk than the other two, but crop and cattle keeping have a higher rate of return and therefore the capability to alleviate poverty in a household if well practised. Although in the area there is a good potential for bee keeping, only a few people (6)

practise it. This is basically due to lack of knowledge on how to practise it. There is very little information if any provided to farmers on bee keeping and therefore the few, who practise it, do it for subsistence use.

4.2.3 Description of farming practices in this area

Information on this aspect was sought from the key informants because they had a wider access to every form of agricultural practice in this area. Some of the statements they used to describe farming in this area included:

a) "Farming in this district is poor and traditional where farmers do not want to use the modern farming technology. For instance they don't use fertiliser; seeds are the stored last season's harvest year in year out" (*Respondent #1).*

b) "Farming in this area is very risky due to the uncertain weather conditions experienced in this area. Farmers will put a lot of effort in farming but rains fail hence discouraging and frustrating them" *(Respondent #3),* but one good thing they noted with the farmers is that they don't despair and always a next time season is given full trial.

c) "Whenever a good harvest is witnessed in this area, the produce is usually sold at a throw away price, due to lack of information on the prevailing market prices and the failure by the government to intervene and buy the stocks. Middlemen take advantage of the inaccessibility of the area due to poor road network to buy the harvests at low prices claiming of a lot of expenses in terms of transport" (*Respondent #4).*

d) “Poor storage conditions for the harvests have been witnessed leading to cases of Aflatoxin infecting the harvests. This has led to major losses especially whenever there is a bumper harvest because the two rain seasons experienced in this area are not that much apart and therefore before the harvest from one season has dried and stored properly, the next season has already taken off leading to the previous harvest not drying properly for storage and people in the area do not know any other alternative way of drying the harvest” *(Respondent #5).*

The description of the farming practices in this area also represented some of the challenges the rural farmers in this area faced. The researcher sought to know whether if provision of relevant and timely agricultural information could help farmers to tackle the challenges highlighted, all the respondents were in agreement.

4.3 Information Needs and Sources

4.3.1 Information needs

The first objective of this study was to identify the information needs of rural farmers in Lower Yatta District; the researcher asked the farmers to state their information requirements. According to the info-mobilisation theory, when defining a community’s information requirements, they have to be based on the needs and priorities which have been expressed by the community itself. Additionally, Wilson’s model of information behaviour, information needs of a community are determined by the role, context and individual features. Their responses are as shown in the figure below:

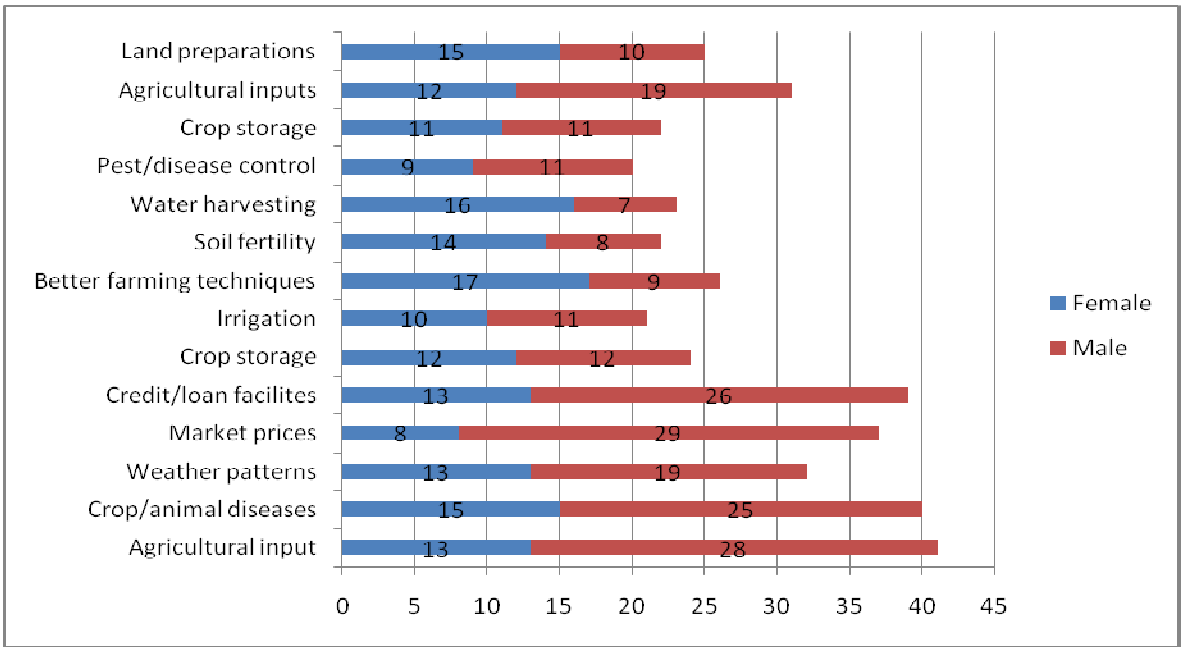

Figure 4. Information needs by gender

The study findings show that there are slight variations in information needs according to gender. Males needed more information on market prices 59% (29), agricultural inputs 55% (28) and credit facilities 51% (26), while females needed more information on better farming techniques 33% (17), water harvesting 31% (16) and crop/animal diseases 29% (15) (see figure 4). These findings are supported by other researches done by various scholars in different countries (Adomi et al., 2003, p.45, Lwoga, 2008) who reported that there was a definite gender split in information needs.

Agricultural inputs

Most farmers and in particular male, indicated that they needed information on agricultural inputs. Such inputs in this case included; seeds, fertilizers and farm machinery. “Agricultural output depends on the quality of inputs a farmer uses”, stated one respondent. Most farmers said they practised what they termed as “traditional farming”, whereby they relied on seeds from the previous harvest, they rarely used any

form of fertilizer and used manual tilling of land to cultivate. “This results in poor harvests aggravating the reliance on food aids from the government year in year out”. This information they said, can be got from local radio stations, for example “Mbaitu” FM which has an information programme known as “Uthwii muundani”; while “Musyi” FM has an agricultural programme known as “nima ya matuku aa” meaning ‘Wealth in the farms’ and ‘Today’s farming’ respectively.

Better farming techniques

More than half of the respondents said that they needed information on better farming techniques. This information was more preferred by the women. They were aware that the farming practices they were carrying out were not the best and therefore not giving them the best output, hence they needed to know how they could improve their farming. They said that they access such information from newspapers and Television, but they think that such practices as shown in the media cannot be applicable to them and they hoped that they can get information which can be applied in their situation.

Soil fertility

More female farmers than male farmers indicated that they needed information about soil fertility. “Soil fertility determines the quality and quantity of agricultural output a farmer gets” said one respondent. Some farmers said that they have never enhanced the fertility of their farms, and others said that they used traditional fertilizer in the form of manure. They seemed to lack knowledge of any form of fertiliser available in the market. Some were quoted saying that “the information sources accessible to them

just give the names of the fertilisers but do not expound on their uses and application", and therefore lack of such information makes them reluctant to make use of them.

Crop/animal diseases

Several farmers stated that they needed information about crop or animal diseases which infest their crops or animals. This area is prone to such crop diseases like leaf yellowing, wilts, blinds (mbevo), and animal diseases like foot and mouth diseases, anthrax, trypanosomiasis are present. Most farmers rely on traditional herbs to treat such infections. There are established traditional healers who are able to diagnose the infections and advise on its treatment. Such treatments are very cheap and many farmers prefer them rather than buying pesticides from agrovet shops. Although some farmers were aware of various pesticides in the market and their uses, they said that they did not believe in them because they are not as effective as the traditional herbs.

Water harvesting

Most female respondents were interested in information about ways of harvesting water. Lower Yatta District receives rainfall twice a year; such rains are not guaranteed. "When such rains fall and people know how to harvest water, then such water can be utilised for small scale irrigation before the other season starts", said *respondent #9*. People in this area are ignorant of this fact and those who are aware of such a possibility stated that this should be a government's project. In the neighbouring Mutomo District, there are successful water harvesting projects which have been started by NGOs such as Arid Land Information Network, whereby they provide locals with information on the various ways of harvesting water for domestic use and small-scale farming (ALIN, 2011).

Weather patterns

More than half of the interviewed farmers indicated that they needed information on weather patterns. Mostly men are the ones who indicated that they needed this information. This, they said will help them in planning their agricultural activities. Though they said that they receive such weather forecasts from radio stations and reading the newspapers, they never believed in them because most of the time, they ended up not being the reality. This they attributed to lack of a nearby weather station and hence the broadcasted forecasts are generalised by basing them on a very large coverage. They also stated that there are traditional weathermen in this area who give them information about weather patterns, they relied on experience because they are old people and they have lived across several seasons and therefore can forecast what the weather was likely to be by referring to other similar seasons.

Crop storage

Information about ways of storing harvested produce was required by a certain percentage of the respondents; they said that they needed information on how to store their harvests when they get bumper harvests. This is one of the areas where the government had issued a red flag on the condition of their produce due to high moisture content and therefore such produce like maize end up contacting Aflatoxin. The area has high temperatures during the harvesting season and the farmers could not understand how their produce could have high moisture content despite such temperatures and this was established to be due to the way they store their harvests (Kenya National Assembly,

2010, p.24). It was found out that they do not dry their produce properly once harvested, but instead they harvest them and squeeze them in sacks and pile the sacks in a store and this was thought to be the reason behind such condition.

Market prices

Majority of the male farmers indicated that they needed information about market prices. Most of the farmers in this area were found to be practising subsistence farming and only sell their produce when there is a bumper harvest. This is the only time they could look for information about the market prices but most of them indicated that they needed to be informed on the market prices of the various commodities for their own good. Such information is usually availed to farmers on a daily basis through a programme in one of the local media stations - Musyi FM dubbed “Mathooa ma syindu miundani” meaning ‘Farm produce prices’ whereby it gives daily analysis of the prices of the various produce in the region.

4.3.2 Information access

To quote the words of one of the key informants, in advocating for the establishment of a community information centre, she said that “unless people are equipped with information they need, they will never shake off oppression”. This statement shows the impact information can have to a community. In this regard and in line with research objective two, which was to examine the sources and channels of information access, the researcher sought to know if the rural farmers were able to access information.

Majority of the respondents (97%) stated that they could access the information they needed. Only a few (3%) stated that they could not access information needed and this they attributed it to lack of awareness of what sources of information were available to them and how they could use them.

4.3.3 Information Sources

Also to answer research objective two, respondents were asked where they get information on issues of interest to them. The researcher wanted to establish where the farmers got information from. Figure 5 below illustrates the responses on the question: where do you get information on issues of interest to you?

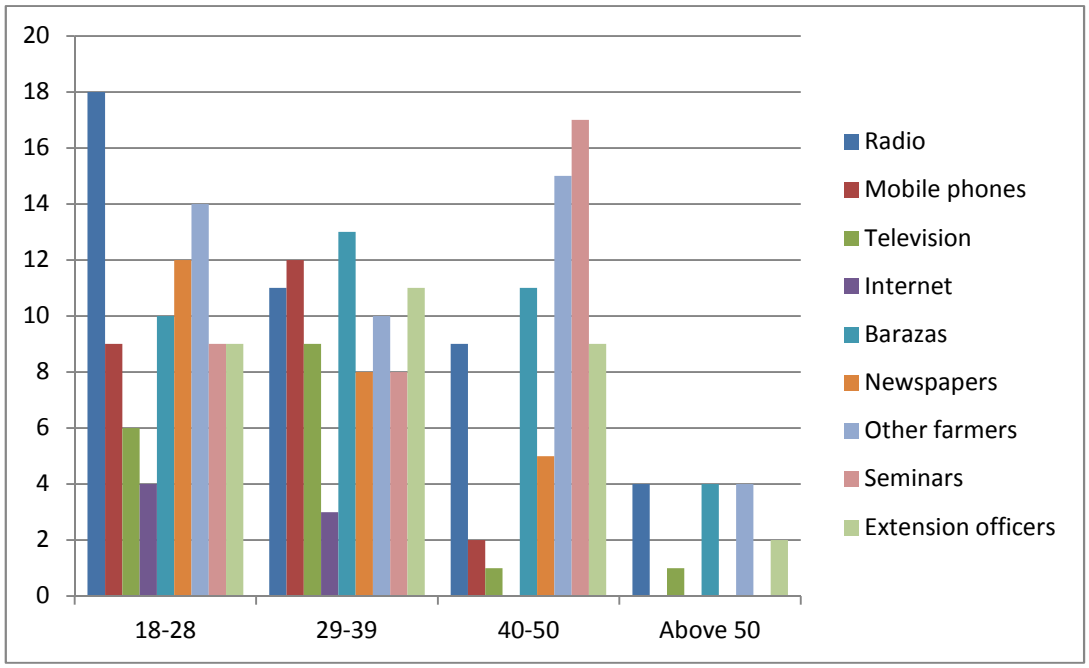

Figure 5: Information sources by age

There were variations in information sources with age. More young farmers between 18 to 39 years accessed information from radio, other farmers, newspapers, barazas,

mobile phones and extension officers. Figure 5 above indicates that young farmers preferred radio, mobile phones, and newspapers as sources of information compared to other age categories. Elderly farmers preferred radio, barazas, seminars and extension officers. Radio was a common information source across all age categories. This finding is supported by other studies done in Nigeria and Tanzania (Adomi, 2003, p. 391; Lwoga, 2010, p. 298). Other sources of information highlighted by the key informants interviewed included: posters, SMS alerts, agricultural shows, agricultural journals and farmers' meetings.

In reference to the info-mobilisation theory which informs this study, an information system has to be studied together with the social context where it will be applied for it to be successful. The farmers gave different ways through which they get information, but each source depends on certain factors like accessibility, availability, ease of use, ability to expound on issues, and relevance of the information it provides. Most of the farmers indicated that they get information from radio and more specifically through the local media stations which broadcast in their local language and which broadcast information related to their needs. Some advantages they raised with radio is that it is affordable, easy to operate and easy to maintain.

On the same note, they were asked to state why they preferred the information source they indicated, and the table below shows some of the reasons they gave.

Table 3: Information sources against their preference

Information source	**Reasons for preference**
Radio	Accessible, affordable, easy to maintain

AEOs	Give personalised service, provide latest information, one can be questioned further.
Newspapers	Can be kept for reference, gives in-depth information
Church organisations	They have no hidden agenda i.e. they give information for common good of the people.

4.3.4 Information gap

After establishing what the farmers needed, the researcher sought to know the information the farmers wished to have but it was not available to them. This was to enable the researcher to establish the information gap among these rural farmers. This was to enable policy makers to know what was available and what was not. The responses are as shown in the table below:

Table 4: Information gap

Information needed but not available	**(n=51)**
Market pricing/trends	43
Adaptive breeds	38
Climatic changes	21
Indigenous foods	19
Credit facilities	15
New technologies (machinery, seed)	14
Crop pests	5

Most farmers felt that information on market trends was not provided, information on adaptive breeds, information on climatic changes available to them, information on indigenous foods, information on credit facilities and information on new farming technologies and crop pests followed in order of frequency.

Even though some information was available in bits and pieces from various sources, they felt that this was not helpful as it needed organisation. Also, it was felt that much of the information was very general and therefore not applicable to their area. They said “we need information relevant to Lower Yatta district, information like adaptive breeds, since one type of breed can do well in one part of Ukambani and fail in another part hence those giving such information generalise the whole of Ukambani not bearing in mind that this is a vast area and therefore there are different physical and climatic conditions”. *(Respondent #4)*

4.4 ICTs and their uses

4.4.1 Information infrastructure in the District

Information on this area was gathered through document analysis; such documents included empirical literature and research reports. It was found that a number of shopping centers are linked to the telephone network manually operated exchanges. There are a few newspaper bureaus based in Kitui Town which is 70kms from Yatta. These bureaus gather, process and disseminate political, social and economic development information. The newspapers that circulate in Kitui District include Daily Nation, Kenya Times, The People, and The Standard together with other gutter press

papers, but only a few copies of Daily Nation and The Standard reach Yatta shopping centre where the rural farmers can access.

The district is covered with television and radio networks. According to Kenya National Mapping (2004), 1 out of 381 households in the area have access to television sets. However, 9 out of 10 households have radio systems. The Mobile telephone networks available in the area are Safaricom, Zain and Orange. However, only a few people can afford the handsets. Internet and e-mail services can only be accessed from a few cybercafés in Kitui Town.

4.4.2 Access to ICTs

This question was asked to address research objective four, to map and audit the types of ICTs available and their extent of use by farmers in Lower Yatta District. Respondents were asked to state the ICT devices they have access to. This study attempted to establish whether the rural farmers owned ICTs and determine the extent to which the ICTs were used to access information. The results are as shown in figure 6 below.

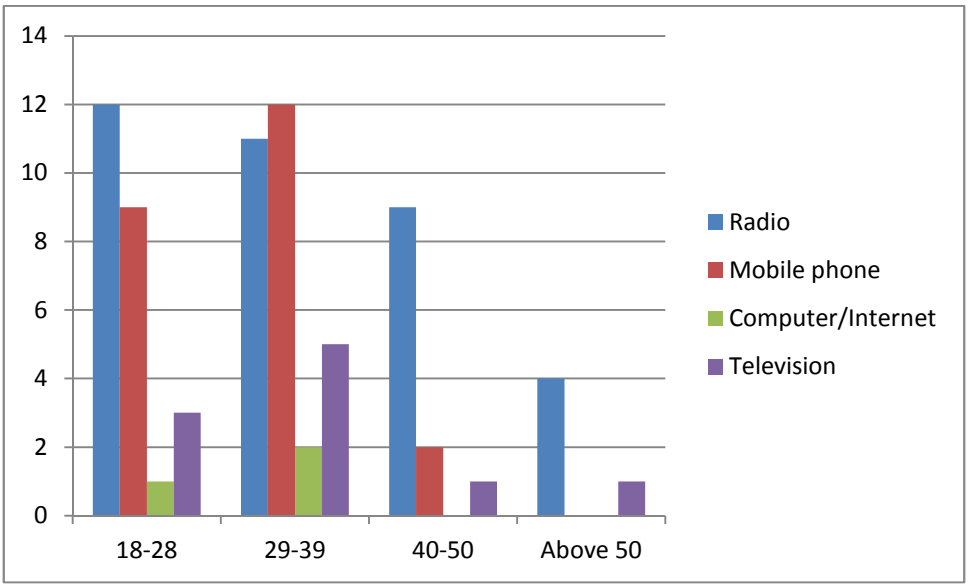

Figure 6: ICT access

There were variations on the ICT access by age (see Figure 6). Most ICTs were used by the young farmers aged between 18 and 39 years as compared to the elderly farmers. The frequencies of young farmers' ownership of ICTs was 23 (45%) for radio, 21 (41%) for cell phones, 8 (15%) for television and 3 (6%) for computer or internet. The elderly farmers aged above 50 years mainly relied on radio and television. From the figure above, it can be seen that radio is the most accessible ICT; majority of the respondents stated that they could access and use radio (70%). The high percentage on accessibility and use of radio is because of its affordability, and maintenance which is cheap, a study done in Tanzania by Charles Kenny, 2002 on '*Costs and benefits of ICTs in poverty alleviation*' supports this finding by indicating that "more than 50% of rural households in low-income countries in sub-Saharan Africa and Asia already own a radio because they are relatively cheap and do not require electrical connection". Also, radio can provide information from various stations, whereby some of them are in the local language of the area which the farmers can understand. The same was found out by

Kenny's study, that "radio programming is cheap enough to be produced locally and in a range of languages". A fifth of the respondents said they had access to television set. The respondents indicated that television set was not as much used as radio because of its initial cost price, requires access to power to use it and the fact that there are no programmes broadcasted in the local language, "information here is either in English or Kiswahili". Mobile phones being the latest technology to be used had a few users. This is basically because it is a new entrant into the ICT world, its initial cost, maintenance, and complexity in use compared to radio and TV (Batchelor *et al*., 2005, p. 89). Another new ICT entrant is the use of computer connected to the internet to access information. Only a small percentage of the respondents interviewed said they had access to computer or internet. They accessed the internet either through a computer at their work places or cyber cafes or through their mobile phones. No respondent had a personal computer but they accessed such information whenever they visited a cybercafé whereby such cafes could only be found in Kitui town, which is more than 70kms from the area. Access to such information required the user to incur some costs and therefore only a few could access information from the internet. This applies to what Kenny's study found out that "internet as a tool for information access requires a fairly high level of education and computer literacy to be used constructively and other extra charges as access fee" (Kenny, 2002, P. 149).

4.4.3 Awareness of information programmes on agriculture from any ICT

To be able to determine the extent of usage of the ICTs, the respondents were asked if they were aware of any information programmes on agriculture provided by the

various ICTs they could access. This was to determine the level of awareness of the existence of such programmes by the farmers.

Majority of the farmers (58%) interviewed said that they were aware of agricultural information programmes provided to them by the various ICTs. Only two fifths (42%) were not aware of any programme and they said they did not see ICTs as a channel through which information can be provided. This shows that more than half of the respondents knew the existence of such programmes.

The same information was sought from the key informants, to know whether they knew whether the farmers were aware of the information programmes availed to them; and half of them said that they were very aware and the other half said that they were fairly aware.

For the ones who said that the farmers were fairly aware, they needed to provide ways through which they planned to make the farmers aware. The following are the ways of increasing awareness as expressed by three key informants:

- Having road shows
- Holding ‘barazas’ frequently
- Through posters
- Airing programmes at peak hours on radios and TV

To determine the extent of awareness, the farmers were asked to give the information programmes from the identified ICTs which they were aware of. Table 5 shows the

information programmes they said they were aware of which were provided by various ICTs.

Table 5: Information programmes

Information programme	**ICT used**
'Ikya Kwoko' – Work Hard	Radio – Musyi FM
Weather forecasts	TV, radio, internet
'mathooa miundani'/market prices	Radio, TV
Ukulima bora	Citizen radio & TV
Kilimo	KBC radio & TV
Mtunze punda akutunze	Radio, TV
'Uimi museo' Better Farming	Radio – Musyi FM
Sending seed code through a SMS to determine if it is genuine.	Mobile phone

4.4.4 Uses of the ICTs

The respondents who had access to certain ICTs were asked to state for what purpose(s) they used those ICTs. Although in the paragraph above we have seen that the farmers in this area had access to certain ICTs, it was important to know for what purpose they used these ICTs, so as to ascertain if they were using the ICTs for agricultural

information access. Figure 7 below shows the various uses the farmers were using the ICTs.

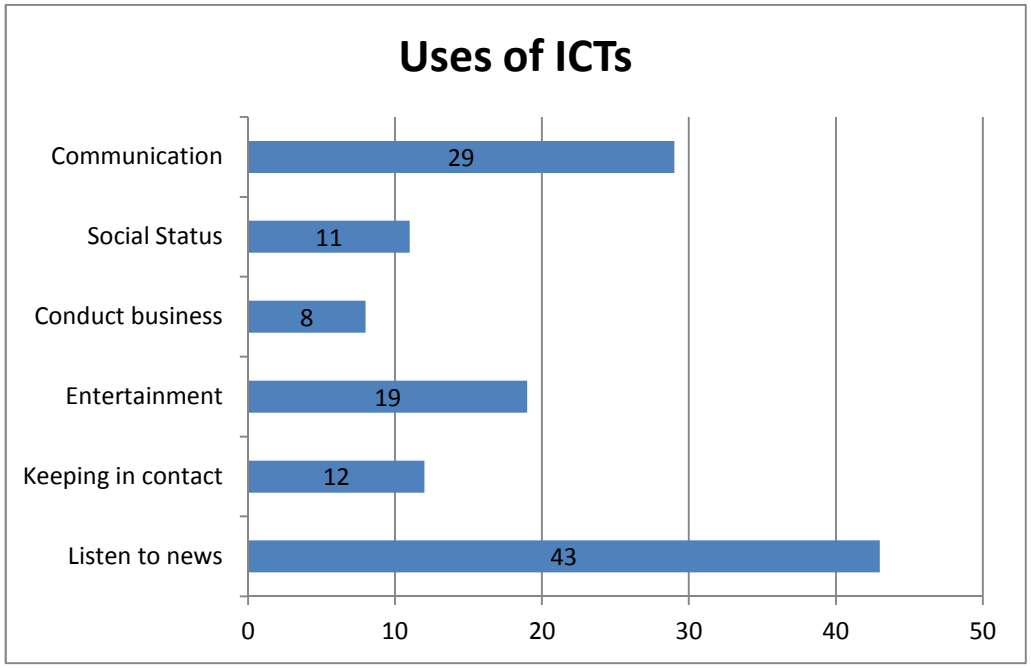

Figure 7: Uses of ICTs

Majority of the respondents said that they used the ICTs they had for the purpose of listening to news. They said that mostly, they bought such ICTs like radio and TV to be kept informed of what is happening around the world. The news did not matter if they provided important information on their agricultural activities, but they needed to know what is happening around them. A third of the respondents said that they used the ICTs to keep in contact with their relatives and friends; this was especially for mobile phones. Entertainment was another reason why farmers were using ICTs, some respondents said. ICTs used for this purpose include radio, mobile phone and TV. Only a few respondents said that they used ICTs to conduct business, this shows that only a few people recognise the power of these ICTs in the process of conducting businesses. Social status is another

reason a quarter of the respondents gave as the reason they used ICTs. ICTs used for this purpose include Mobile phone and TV. More than half of the respondents said that they used ICTs for communication; mostly they used mobile phones and internet for this purpose.

It was realised that the respondents did not use the ICTs to access information about agricultural activities they practice. Although in one way they received such information, it was only information broadcasted during the time they were waiting for news or an important event was being aired. This is what Wilson's model regards as passive attention when it comes to modes of obtaining information. This means that they did not realise the potential of such ICTs in providing information on agriculture.

4.4.5 Problems experienced in access and use of ICTs

The fifth objective sought to identify the challenges that faced rural farmers in using ICTs to access agricultural related information. Most of the respondents interviewed said that there were problems with access and use of ICTs in the provision of information on agriculture.

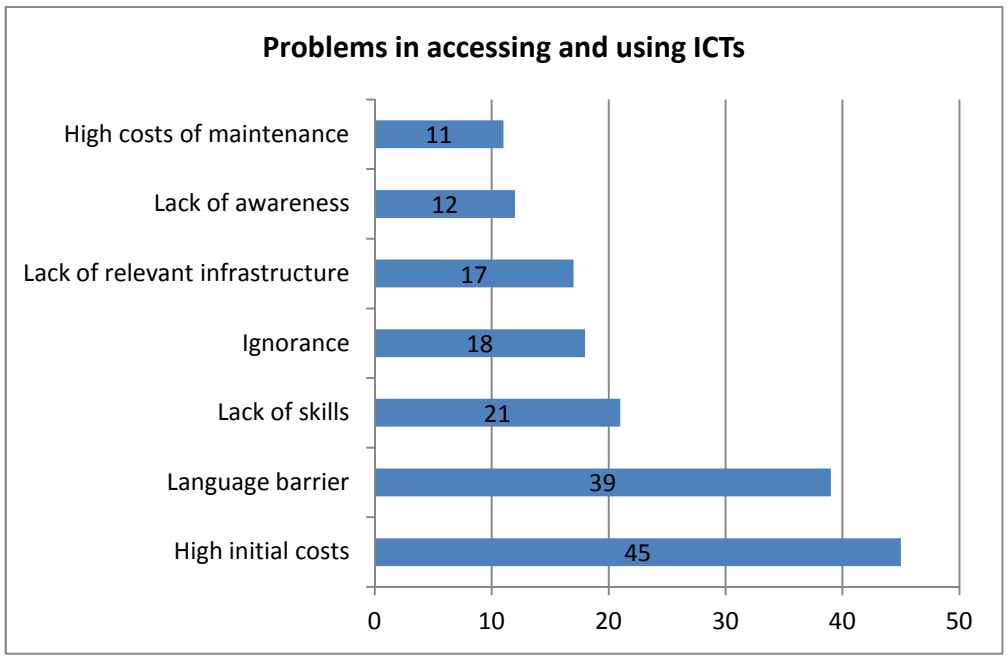

Figure 8: Problems experienced in accessing and using ICTs

The problems are discussed in detail below:

High initial costs

Almost all the respondents interviewed said that they experienced the problem of the ICTs having high initial costs. “ICTs like TV and mobile phones are expensive for a common farmer to afford”, one respondent said. “Buying such ICTs requires one to have saved for several seasons but we have other immediate and pressing needs which require

money", another said. Asked how much was required, they said that one has to part with a minimum of Kshs. 10000 for a TV set and Kshs. 5000 for a good mobile phone. "Getting this amount of money is not easy" (*respondent #5).*

Lack of awareness

A third of the farmers interviewed said that they had a problem of lack of awareness of the potential of such ICTs in farming. They said they would prefer to buy something else but not an ICT. "Such is not my priority", one of them said. Even though they know such devices exist, they do not know the purpose for which they are acquired for and their potentiality in providing information which can be used to improve farming.

Language barrier

Majority of the respondents said that they had a problem of not understanding the language some ICTs broadcasted their programmes in. "Some things like TVs and internet avail their information only in English or Kiswahili", said one farmer considered to be illiterate. This presented a problem to them and therefore they preferred ICTs like radio rather than TV because they could provide information in their local language which is understandable to them. Some of the literate farmers said that they preferred listening to programmes in their local language rather than the ones in English or Kiswahili.

Lack of skills

Half of the respondents interviewed said that they lacked the skills to use certain ICTs like the mobile phone and the internet. They said that, they only used mobile phones for communication and they did not know how to access information using them. For one to be able to access information through the internet, he/she needs to be computer literate, and only a few had basic computer literacy skills.

Lack of trust

A number of respondents said that they never believed in the information provided through such media. They said that such information is foreign and therefore not meant for them or it was so irrelevant such that it could not benefit them or it presented requirements that were out of their reach and therefore they did not see the need to take it into practice. This is due to the problem of ignorance, because such farmers seemed to know the existence and potentiality of such information but considered it not good for them.

Lack of relevant infrastructure

Respondents largely from Nthongoni, Kanyangi, Kiseuni and Kanyongonyo said that the area lacked the relevant infrastructure to support certain ICTs. There is lack of electricity, poor network connection and even poor mobile phone network. ICTs like TV, mobile phones and internet require such infrastructure to function, and with the state of such infrastructure, it becomes quite difficult to access and use such ICTs even if they know how to use them.

High costs of maintenance

11 out of 51 of the respondents interviewed said that they experienced the problem of ICTs having high costs in their maintenance. “Most of these ICTs require high initial costs and maintenance costs which are not affordable”, one farmer said. Such ICTs are like mobile phones, internet and television in terms of electricity charges, mobile credit top-ups and internet surf charges. “Such charges are beyond our reach”, another one said.

4.4.6 Suggested solutions to the above problems

The respondents were asked to suggest possible solutions to the problems they had raised in the previous question. This was to enable the researcher to know what the farmers think works for them and therefore help the in coming up with recommendations. The suggested solutions are as shown in the figure below:

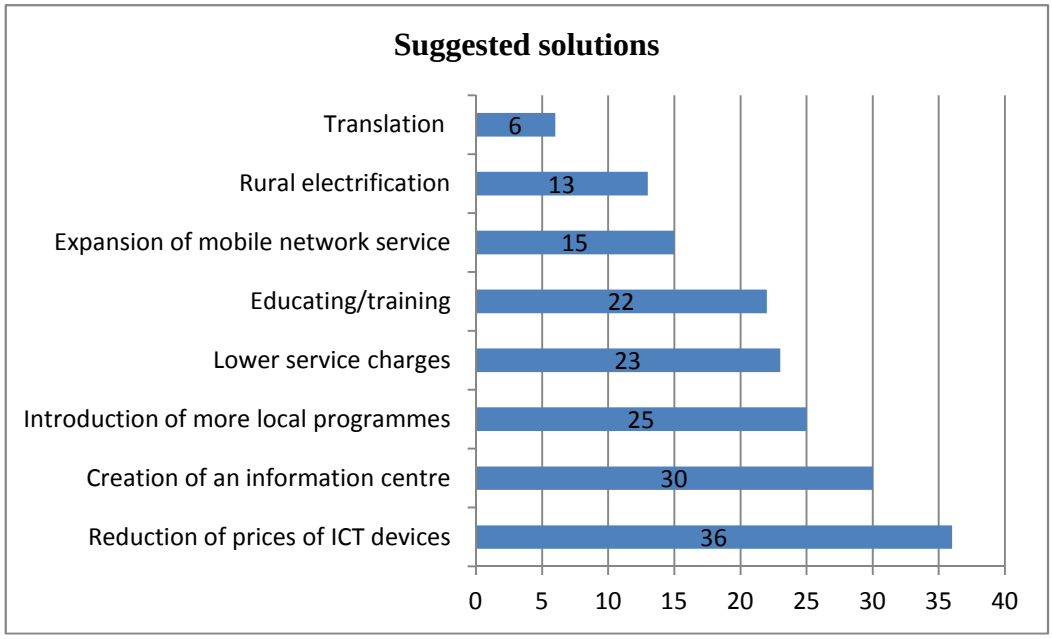

Figure 9: Suggested solutions

Most of the respondents (36) felt that reduction of prices of ICT devices like mobile phones, TVs and computers would enhance access to such devices and hence the information they provide.

Another suggested solution by most of the farmers (25) was the introduction of more local programmes; this involves having more local channels in the radio communication network. “Currently, there are only three local channels which broadcast in our local language, but it is only one channel (Musyi FM) which can reach most listeners without frequency interruptions and therefore provide the needed information” *(Respondent #13).*

Educating or training the farmers on how to use the various ICT devices was also suggested by 22 out of 51 farmers as a solution to the problems hindering ICT usage. It was indicated that mobile phones had a lot of potential to convey the information they need and also for the government agencies and parastatals involved with agricultural information provision could make use of such device to convey this information to rural farmers as they quoted it happens in some villages in Uganda. But this is hindered by the fact that they don’t know how to make use of the mobile phones to access this information or the internet and education or training would be the best way to go about it.

A problem they had expressed before was the high service charges put on by mobile service providers or the internet cafes. A suggested solution by 23 out of 51 farmers to this problem was for the mobile phone service providers to lower their prices

for accessing the internet or sending or receiving information and also for internet service providers to lower their internet charges so that many people can access the information through the internet and also to have enough time to access the required information for their agricultural practices.

Although there is some mobile service network available in the area, there are some areas where it is not available at all. The area has only Safaricom and Airtel service network whereby the Safaricom network is not strong enough and also does not cover most of the areas. With this in mind, there was a suggestion that the mobile service providers to expand their network coverage for the whole district.

All ICT devices require a form of energy to be able to function, the source of energy has been a problem to most residents because there is no electricity. But currently, there are signs of relief to this problem with the rural electrification programme, as most of the areas have been surveyed and work has started of laying electricity cables and posts. The worry by the farmers was that this was taking too long and therefore there is need to speed up the process and hope the programme will succeed in lighting most of the areas in the district and not stall as most government projects have stalled.

Translation of some information programmes provided by some broadcasting stations and not in their local language was suggested as another possible solution. They said that there is need for such informative programmes to be recorded and translated into Kikamba and provided to them either through barazas or seminars.

Creation of an agricultural information centre within the district was another suggestion put forward. They said that, since the information provided through the various channels cannot be stored by the farmers for future reference, it is good to create an information centre in the district and be mandated with the responsibility of researching, and recording information provided which is relevant to the agricultural needs of the community and in this way the farmers would be in a position to refer to it when in need.

4.4.7 Ways of enhancing information access through ICTs

After asking about the challenges they encountered in the process of accessing information from various ICTs, both the farmers and key informants were asked to give their views on ways through which ICTs can be used to enhance access to agricultural information. The following were the suggested ways:

1. More programmes on agricultural aspects

They said that there is need for more information programmes on agricultural aspects. “Agriculture is a very wide concept and there is need for each aspect to be covered in one way or another, this can be achieved by having programmes on what is not already covered so that ICTs can provide all-round information on agriculture” (*Respondent #32).*

2. Timing of the programmes

Information is only beneficial if it reaches the intended user, but if it does not, it is as well as non-existent. For the information to reach the intended audience, timing of when this information is availed to the farmers is very important. “Such programmes should be aired at night when people are resting from hard day’s work on their farms” *(Respondent #9).* They said that a programme like ‘uimi museo’ in Musyi FM is broadcasted at 10.00am when they are busy in their farms and therefore does not reach them, it is therefore important that such programmes be aired when the audience is available to listen to them.

3. Establishment of information gateway

“The government should setup an information gateway from where the farmers can get all the information they need” *(Respondent #32).* This can be done by collecting information on agriculture and creating an information system for it and when a farmer needs such information he/she needs to send a message and it is availed to him/her. “Such information should be localised such that a farmer from this locality will get information relevant and applicable to this area”, he added. Here the researcher interjected that to some extent this was possible, because if a farmer wanted to know what type of crops to grow in a certain region, they need to send an SMS with the regions name and they will receive a reply of what is to be grown in that particular area.

4. E-commerce application

ICTs can be exploited in the agricultural industry the same way they have been utilised in other sectors like banking, education etc. “a farmer should be able to carry out

business transactions through his/her mobile phone" *(Respondent #8).* These include requesting for market prices, contacting customers or suppliers and even paying for supplies through mobile money transfer and also receiving payment through the same.

5. Multimedia capability

ICTs have the capability of presenting information in various formats to different audience. Such capability can be used to present information to farmers in the format they best understand. For instance for illiterate farmers, ICTs can present information in audio-visual format and they can understand it better than if it was printed.

6. Ensuring information relevance

Since ICTs have the capacity to provide as much information as possible and from varied sources, this has been misused by providing irrelevant information. ICTs can be used to classify such information into its areas of applicability and therefore presenting relevant information to the right people.

4.5 Benefits of accessing and using information

To help in the conceptualization of a model which was the main output of this research, the respondents were asked to state the impact/benefit they achieved after accessing and using information in their agricultural activities. The responses are as shown in the figure below:

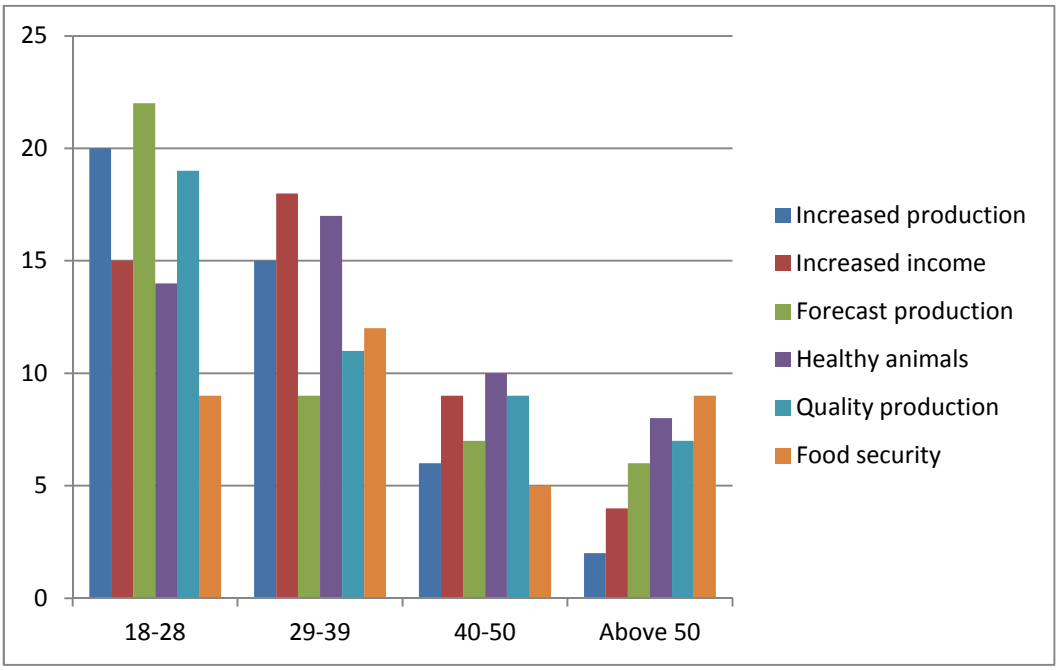

Figure 10: Benefits accrued by farmers from accessing and using information

Information was sought on the benefits of accessing and using information, and there were various benefits which the rural farmers got by accessing and using information in relation to agricultural production. As shown in figure 10 above, young farmers accessed information from various sources, and from figure 6, the same farmers used mostly ICTs to access this information. Most young farmers indicated more benefits of accessing and using information compared to elderly farmers who relied on other sources of information rather than the new ICTs.

Most respondents indicated that, after accessing and using information, they had healthy animals and crops, other benefits were increased income, quality production, forecast production, increased production and food security in order of frequency. On increased income, respondents said that information on market prices enabled them to price their produce competitively since they were aware of what was the market price and

therefore avoided throw away prices offered to them by middlemen. “Since we are informed, no one can take advantage of us”, one of them exclaimed. Across all the age categories, they had one or more benefits they enjoyed on accessing and using information in their agricultural practices. The same findings were reported by a study done in Tanzania (Lwoga, 2010, p. 305).

4.5.1 Challenges faced in accessing and using agricultural information

In order to address research objective six, the respondents were asked to state the challenges they faced in accessing and using agricultural information. It is only after identifying the problems that suitable solution could be suggested to mitigate them and make information provision efficient and effective. The challenges are discussed in the text below;

One of the major problems cited by the respondents was lack of an information unit in the area to provide information. “The area does not have even a single information unit for information provision. Information about agriculture is found in several sources and scattered all over. Due to this, it is possible for farmers to miss very important information; like if it was a live radio broadcast about a certain farming technique and the farmer is not tuned in, then he/she will miss that information. But if there was a central unit charged with the responsibility of collecting and organising such information, then the farmer can later on refer to such information at his/her own time of need” *Respondent #32.* The farmers had seen this work with their neighbouring district, Mutomo District. There is an established information centre (Mutomo Maarifa Centre) charged with the

responsibility of collecting relevant agricultural information and sharing it with farmers in the district through various means including ICTs.

Another problem raised was lack of time to look for information. Due to the above problem, information being scattered in various sources and available in various places, and coupled with the fact that farmers are busy people; a farmer is likely not to get free time to go looking for information.

Some information sources are costly. “Information sources like acquiring a newspaper everyday can be a costly venture and therefore people tend to buy them only when it is necessary and because newspapers are printed daily, one would miss very important information when it is published” (*Respondent #28).* Also other sources like television, mobile phones and internet are costly and therefore not affordable to a common man.

Another problem raised was that, most of the information provided is general in nature and not specifically relevant to this area. Lack of relevant information covering the district was highlighted as a challenge. “Most of the information sources provide information which is general and irrelevant and therefore impractical in this area” *(Respondent #12).* With this trend, the farmers lose faith in such information since it is not applicable and therefore not helpful to them. One farmer said that “information not helpful or applicable is worth not having it”.

Language barrier was raised as another challenge. Most of the information sources are in a language most of the farmers cannot understand. Information is only availed in their language by three local radio stations (Musyi FM, Mbaitu FM and Syokimau FM) and also by the extension officers if they know the local language. “Sources like newspapers, printed brochures, information through internet and television is either in English or Kiswahili, whereby only a few of us can understand these languages”.

Another problem cited was that, though the majority of the respondents were literate, not all could understand technical and scientific terms and concepts found in most agricultural publications. A good number had only ordinary literacy with no technical literacy at all. This gave them a problem in interpreting information like pesticide measurements or composition.

4.5.2 Suggested solutions

The respondents were asked to suggest possible solutions they think could remedy the above challenges to help the researcher come up with recommendations, and these are the suggested solutions:

The farmers felt that there is need to establish a central information unit within the district charged with the responsibility of collecting, organising, repackaging, translating and disseminating agricultural information to rural farmers. Such an information unit will be useful in that all agricultural information will be accessed from a central point and even interpretation of what cannot be understood can be offered. Also, it could act as a

reference point whereby if a farmer requires certain information and it is not available they can refer him/her to another source.

Another suggestion was appropriate timings of agricultural information programs on radio and TV. They said that most programs are aired during the day when they are busy in their fields, and therefore such information will not reach them. They suggested that if such programs can be aired at night between 8-10pm, then they could reach a large audience because that is the time people are resting and relaxing. Also timing in terms of the time in the season, whereby if it is planting season, information related to farm inputs, farming methods should be provided rather than during harvesting or marketing information.

Formerly, Lower Yatta was a division, and now it has been elevated to be a district. It had only two agricultural extension officers covering the whole division, and still it is the same case now. A suggestion was put forward to increase the number of extension officers to at least five, this would be a good number to manage the district. “More agricultural extension workers will be able to reach as many people as possible and hence meet their information needs” stated one respondent.

Another suggestion was that there is need for local research to be undertaken so as to offer practical solutions to the problems affecting the rural farmers. Instead of solutions being lifted from other places and being implemented in their locality, it was felt that local research would help in identifying relevant solutions to local problems in

this area. For example, one farmer said that “when it comes to indigenous foods, there is need to identify which ones can do well in this area and not suggesting ones which have done well in another area”.

Training of trainers seminars need to be organised. Since not every farmer can be trained on appropriate agricultural practices, the farmers themselves can choose a representative among themselves and the person is trained and with this, it would be possible for all villages to have a representative who can then train the individual farmers on their farms or even the person can acts as a reference point when a farmer needs certain information. Having trained farmers within every village, then information would be easily accessible from such persons. From the question on information sources, the farmers had indicated that only a few of them sought information from other fellow farmers, so the researcher wanted to know how this solution would work and from a previous point, it was found that they rarely sought information from other farmers. The respondent replied, “It is because we are not aware if there are any trained farmers in this area, once they train, definitely they will tell us and we will make use of them”.

Formation of groups was cited as another solution, in that the people in the group can share the skills and knowledge they have on farming. Also with groups, it becomes easier for the agricultural extension officer to reach most of them unlike visiting individual farmers. Also, they suggested that with the help of such groups, farming can be specialised and production can improve. This will eliminate a scenario whereby you

find every household is involved in the same agricultural activity instead of diversifying into different activities and having almost all agricultural produce available in the district.

4.6 Policies to be put in place to provide agricultural information

The researcher sought to know from the key informants who are the policy makers in the area what policies they were to put in place to provide agricultural information. Some of the responses they gave include:

a) Providing information at appropriate times through the local radio stations.
b) Organising exhibitions with seed companies and farm machinery companies to show case what they have.
c) Encourage farmers to form groups to enable extension workers access a large group at once and be able to bargain for prices of inputs and produce.
d) Provision of electricity
e) In collaboration with Ministry of Agriculture, increase the number of AEOs in the district and create information gateway for the farmers.
f) In collaboration with seed companies, provide means of certifying seed quality.
g) Sensitising farmers on ways of marketing their products.
h) Establishment of local research units in the area
i) Organise visits to various places with the same climatic conditions with the area to find out how farming is practised.
j) In collaboration with stakeholders in the agricultural sector like KEPHIS, sensitise the farmers on ways they can access the required information.

CHAPTER FIVE:

SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In this chapter, a summary of the findings is given and then conclusions are drawn from the analysis of the data. This has been done in view of the aim and objectives of the study. Then from these, a model on how to optimise the use of ICTs in the provision of information to rural farmers in the area is made. The aim of the study was to investigate the role of ICTs in information provision amongst rural farmers in Lower Yatta District, and recommend a model for optimizing ICT use in information provision.

5.2 Summary of Findings

5.2.1 Personal Data of the Rural Farmers

1) The research has revealed that there is gender disparity on access and use of ICTs for information provision, and also in terms of awareness and the need to be informed. More men were interviewed in this research because they seemed to have more information than women.
2) In terms of age, most respondents were below 40 years of age. They are relatively young and this puts them in an advantageous position when it comes to accessing information. They are energetic and versatile and owned more than one ICT and could sacrifice their time to search for information for they knew its importance. Also young people accessed information from various ICT sources than the older farmers.

5.2.2 Information needs

The research has revealed that the rural farmers need information to be able to succeed in their farming. They have a wide range of information needs. However, they singled out information on agricultural inputs, better farming techniques, weather patterns, soil fertility, crop/animal diseases, market prices, and crop storage as their main information needs.

From the findings, it is evident that information is crucial for the practice of better agricultural activities and better outputs.

About the information, they desire but they do not receive presenting an information gap, it included information on credit facilities or loans, adaptive breeds, indigenous foods, market trends and crop pests. This shows that even though there are various sources of information available to farmers in this area, they do not provide all the required information and therefore there is an information gap. Also, the information provided to them is not specialised enough to meet their needs because most of it gives a general point of view and in most cases, they find it not relevant to their practices.

5.2.3 Information sources

An inquiry on whether the farmers in this area received any information on agriculture revealed that most of them do receive it but from various sources. The research revealed that farmers in this area preferred traditional ICTs as sources of information rather than the new ICTs. Traditional ICTs mostly used included radio, TV

and newspapers. This shows that the new ICTs have not been exploited by the farmers in this area.

The farmers highlighted the various sources of information which are accessible and available to them as follows; radio, TV, barazas, agricultural extension officers, seminars, other farmers, posters and newspapers. At this point, the key informants added that the best ways to improve access to such information was through farmers forming groups and through this AEOs can hold talks, attend shows, and receive SMS alerts on various agricultural aspects.

In terms of preference of sources, the research revealed that most farmers preferred to receive information on agriculture from radio because it was affordable, accessible and easy to maintain and also because there were local stations broadcasting in the local language. They also preferred getting information through the AEOs because they gave personalised information service and they were available for questioning and clarifications and even gave demonstrations where needed. Newspapers were also another source the farmers preferred because of its ability to give in-depth information and also because it could be kept for future reference. Church based organisations were also cited as other ways through which the farmers preferred to get information because they are non-partisan and do not have any hidden agenda when giving such information.

5.2.4 Benefits of access and use of information on agriculture

The research revealed that access and use of information on agriculture had a great positive impact on the production capacity of the farmers. Most important is that it

led to improved production of the farms and animals, the farmers cited that when they used the information they accessed on their farms they experienced an increase on the production of the farms. Another benefit was that there was an improvement on the quality of the produce, for example the farmers had healthier animals and crops which gave a lot of produce. Also the farmers were in a position to forecast their production basing on weather forecasts given if predicted correctly, they could foresee if they would get a bumper harvest or poor one and therefore plan ahead. Improved sales was another benefit which the farmers expressed they got by using information, this was due to having information on market pricing and trends of the various produce they produced and hence middlemen could not take advantage and offer them low prices. Also with increased production, it meant that they could make better sales which translated into more money and better living standards.

5.2.5 Challenges in access and use of information

The research revealed that there are various challenges which hinder farmers from accessing and using information, the following are some of the challenges they cited.

One was the lack of an information unit in the area to provide such information. The area lacked an information unit for information provision. Information about agriculture was found in several sources and scattered all over. Due to this problem, it was possible for farmers to miss very important information, for instance a live radio broadcast on a certain farming technique, and the farmer was not tuned in then he/she will miss that information. But if there was a central unit charged with the responsibility

of collecting and organising such information, then the farmer can later on refer to such information at his/her own time of need. This issue has been echoed by Stienen, 2007, who notes that information to sustain and increase agricultural production is spread over different agencies, notably farmers, universities, research institutes, extension services, commercial enterprises, and non-governmental organizations (NGOs). Therefore, this knowledge is often poorly documented or hard to access.

Another problem was lack of time to look for information. Due to the above problem, information is scattered in various sources and available in various places, and coupled with the fact that farmers are busy people; a farmer is likely not to get free time to go looking for information.

Some information sources are costly. Information sources like acquiring a newspaper everyday can be a costly venture and therefore people tend to buy them only when it is necessary and because newspapers are printed daily one would likely miss very important information when it is published. Also other sources like television, mobile phones and internet are costly and therefore not affordable to a common man.

Another problem raised was that, most of the information provided is general. Lack of specific information covering the district was raised as a challenge. Most of the information sources would provide information which is irrelevant and therefore impractical in the area. With this trend the farmers would lose faith in such information

since it is not applicable and therefore helpful to them. One farmer said that “information not helpful or applicable is worth not having it”.

Language barrier was raised as another challenge. Most of the information sources are in a language most of the farmers cannot understand. Information is only availed in their language by three local radio stations and may be the extension officers if they happen to know the language. Sources like newspapers, printed brochures, information through internet and television is either in English or Kiswahili, whereby only a few of them can understand these languages.

Another problem cited was that, though the majority of the respondents were literate, not all could understand technical and scientific terms and concepts found in most agricultural publications. A good number had only ordinary literacy with no technical literacy at all. This raised problems in interpreting information such as pesticide measurements or composition.

5.2.7 Accessibility of ICTs

The research has shown that the farmers have access to various ICTs. Four ICT devices were identified as the ones which farmers in this area have access to. These included; TV, radio, mobile phone and computer/internet. All the respondents interviewed stated that they had access to radio and used it. So radio was the most common ICT device the farmers had access to. TV was the second with more than half of the population having access to it. Mobile phones and computers were not as common as

the first two, and therefore the common form of ICT device to use to avail information to such farmers can be considered to be either a radio or a TV.

5.2.8 Uses of the ICTs

The researcher sought to establish the ways in which these farmers used these ICTs, because it was one thing to have access to them but another to use them to access information. The research established that most of the respondents used the ICTs to listen to news where they could get latest information on what is happening around them and in their areas of interest and this is where use of ICTs to access agricultural information was brought out. Other uses in order of priority included; communication for mobile phones and computers/internet, entertainment for TV, radio and mobile phones for the ones who had phones which are FM enabled, keeping in contact with their friends and relatives for mobile phones, radio and internet, for social status in the case of mobile phones and TV. They stated that they acquired such devices like TV and mobile phones to keep up with the current generation and not to be left behind in terms of social standing, and finally only a few respondents used such ICTs to conduct business like keeping in touch with their customers, transacting business through mobile phones, or advertising their produce through the various media like radio or TV.

5.2.9 Problems with access and use of ICTs

The researcher sought to know the problems the farmers experienced in accessing and using the ICTs at their disposal. The following were the problems they raised:

1. High initial costs of the devices

2. Lack of awareness of the ICTs potential.
3. Language barrier on usage of certain ICTs
4. Lack of skills to use the ICTs
5. Ignorance on the part of the farmer
6. Lack of relevant infrastructure to operate and support the ICTs
7. High costs of maintenance upon acquisition

They also suggested possible solutions to tackle the above problems which included:

1. Educating or training of farmers on how to use the said ICTs
2. Reduction of the prices of ICTs
3. Introduction of more local programmes broadcasted in the local language
4. Expansion of the mobile network service
5. Rural electrification to provide electricity for the use of ICTs
6. Lower service charges for mobile phone usage and internet access
7. Offer translation service to the farmers for information not in their local languge
8. Establishment of an information centre within the district to cater for the information needs of the community, farmers included.

5.2.10 Ways of enhancing information provision through ICTs

Though ICTs are not a panacea to agricultural and rural development, they have the potential of bridging the information gap for rural farmers with respect to innovative practices, government policies, credit facilities, accessing markets and acting as an effective tool for policy advocacy (Stienen, 2007).With this realisation, the researcher

sought to know from the respondents ways through which the available ICTs can be used to enhance provision of information to them. The research revealed that there are several ways through which this can be done, these include:

a) Having more agricultural programmes on different farming aspects.
b) Appropriate timings of the programmes to reach the audience and also have an impact on the farmers at the time of need.
c) Establishment of an information unit or centre to cater for the community's information needs by collecting, organizing and translating the information to farmers.
d) Exploitation of ICTs in business transactions to cut down costs.
e) Taking advantage of ICTs multimedia capability to reach varied audience.
f) Local research and providing relevant information which meets the farmers' needs in this locality.

5.3 The proposed model

From the analysis and interpretation, the researcher was able to conceptualise a model which can be used to make use of ICTs in Lower Yatta more beneficial in the provision of information which could lead to increased production and improved sales and therefore improvement in the standards of living hence reducing poverty.

Figure 11: Proposed model

This model borrows concepts from the Harris' livelihood framework, info-mobilization theory and the Wilson's model which addresses the use of ICTs in information provision. It improves the existing frameworks by specialising in information provision through ICTs to farmers and the impact it can have on their livelihoods.

The rural farmer accesses information through various ICTs which are available to him/her. This information has to be relevant to his/her needs. For the existence of these ICTs and their well functioning, there is need to have the necessary infrastructure; which is both the information to transmit and the physical infrastructure (electricity, network signals etc). This part forms the basic requirements for information provision to rural farmers.

Upon having the information and the ICTs available to him/her and the support mechanism for operation, there is no impact such a scenario would bring unless this information is put into use. After using it, then the impact can be realised which involves increase in knowledge on the part of the user (farmer). Increase in knowledge can be achieved by the farmer gaining new knowledge he/she did not possess before, diversifying or adopting new knowledge upon getting the information or defending, sustaining, protecting the knowledge he has because he/she has information about it. It is after using information, an improvement in the production levels of the farms can be witnessed. Quality of the produce is another effect use of information can have. This is brought about by using new technologies in farming and certified seeds and fertilizers. Knowledge on weather patterns will help the farmer to forecast the production levels of their farms and this helps them to plan ahead.

Increase in knowledge leads to enhancement of livelihoods (better farming techniques, better pricing, healthy animals, and improved sales) which in turn lead to reduction in vulnerabilities like crop failure, throw away prices. All this in the final end will result in poverty reduction by improving the living standards of the farmers from increased sales, increased production and even being able to sustain themselves economically.

5.4 Conclusion and recommendations for further research

The study has provided a major insight on ICTs and the fundamental role they play in dissemination of agricultural information. They enhance the access to information and provide multiple platforms through which this information can be availed to rural farmers. Therefore, ICTs can be used in information provision in ways that are effective, cost-effective, affordable, scalable and self-sustaining.

It has come out clearly that ICT investments in rural areas are often least prioritized because of the difficulty in deployment, perceived high investment costs, indirect developmental impact, and need for an extended period of time to reap actual benefits. However, the importance of information and communication investment is that once information is accessed, absorbed and translated into knowledge, this knowledge can be stored, further developed and passed on.

The research has shown that the farmers benefited from simple and cheaper technologies carrying useful livelihood information that locals can relate to and use with less

difficulty. The process of combining new and traditional information media can be effective in making the information more accessible to the rural farmers.

What needs to be taken into consideration is the information needs of each community and taking advantage of the various ICTs available to each community and maximise on their potential.

5.5 Recommendations

To ensure that ICTs are available and accessible, and to guarantee that rural farmers benefit

maximally and contribute meaningfully to poverty alleviation, the following are recommended:

Establishment of an information gateway

Establishment of a central information unit within the district charged with the responsibility of collecting, organising, repackaging and disseminating agricultural information to rural farmers could help. Such an information unit would be useful in that all agricultural information can be accessed from a central point and even interpretation of what cannot be understood can be offered. Also, it could act as a reference point whereby if a farmer requires certain information and it is not available, they can refer him/her to another source.

Appropriate timings of agricultural information programs

A change in timings of agricultural information programs on radio and TV to appropriate times. It was found that most programs on are aired during the day when

people are busy in their fields, and therefore such information does not reach them. It is suggested that if such programs can be aired at night between 8-10pm, then they would reach a large audience because that is the time people are resting and relaxing. Also timing of seasons, whereby if it is planting season, information related to farm inputs, farming methods should be provided rather than harvesting or marketing information.

Increase in number of AEOs

Increase in the number of extension officers to be able to effectively manage the vast area. More agricultural extension workers will be able to reach to as many people as possible and hence meet their information needs.

Carry out more local research

There is need for local research to be undertaken so as to offer practical solutions to the problems affecting the rural farmers. Instead of solutions being uplifted from another place and being implemented onto this locality, it was felt that local research will help in identifying relevant solutions to the problems in this area. For example, when it comes to indigenous foods, there is need to identify which ones can do well in this area and not suggesting ones which have done well in another area.

Trainings

Training of trainers seminars to be organised. Since not every farmer can be trained on appropriate agricultural practices, the farmers themselves could choose a representative among themselves may be a village elder and the person is trained and with this it would be possible for all villages to have a representative who can then train

the individual farmers on their farms or even the person can act as a reference point when a farmer needs certain information. Having trained farmers within every village, then information would be accessible from such persons.

Formation of groups

This can be of help, in that the people in the group can share the skills and knowledge they have on farming. It becomes easier for AEOs to reach farmers when in groups than individually. With the help of such groups, farming can be specialised to various ways and production can be improved. This will eliminate a scenario where every household is involved in the same agricultural activity instead of diversifying into different activities and having almost all agricultural produce available in the district.

5.5.1 Recommended areas for further research

This research has basically covered the role of ICTs in information access amongst rural farmers in Lower Yatta District. Further research can be replicated in other districts since success of ICTs in information provision is context-based. This should be done for comparison purposes.

This research's output was a model; further research can be carried out to determine the effectiveness of the proposed model, to enhance the findings of this study, or make suggestions on the model.

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APPENDIX A: INTRODUCTION LETTER TO RESPONDENTS

I am a postgraduate student at Moi University, undertaking a Master of Philosophy in Information Sciences (Library and Information Studies).

As part of the course, candidates must submit a thesis in partial fulfillment of the Degree of Mphil. Information Sciences. My research project is on "***Harnessing Information and Communication Technologies for information access and use amongst farmers in Lower Yatta District, Kenya***." Towards this end, I would like to request you to spare a few minutes to respond to my questions to enable me carry out this study.

I assure you that the answers provided will be used only for the purposes intended in the framework of this study. In the description of results of this survey, no identification of the individuals will be possible. **YOUR INFORMATION WILL BE TREATED WITH STRICT CONFIDENCE.**

Thanking you in advance.

Penninah Syombua Musangi

APPENDIX B: INTERVIEW SCHEDULE FOR RURAL FARMERS

Part one (Personal Information)

1. Location: ……
2. Gender:
   - □ Male
   - □ Female
3. Age:
   - □ 18 -28
   - □ 29 -39
   - □ 40 -50
   - □ Above 50
4. What is your highest level of education?
   - □ University/tertiary/college
   - □ Secondary
   - □ Primary
   - □ No education/schooling at all
5. What farming practice are you involved in?
   - □ Bee keeping
   - □ Cattle rearing
   - □ Crop farming

Part two (Information needs)

6. Where do you get information on issues of interest to you? E.g. radio, barazas, newspapers etc.

   ……

   ……

   ……

   ……

   ……..

7. Do you get any information on agriculture?

   - Yes
   - No

8. If YES what kind of information do you get? (E.g. farm inputs, weather patterns, crop/animal diseases etc)

……

……

……

……

9. Other than the information you have mentioned above, what other information needs would you require but you don't receive?

   ……

   ……

……

……..

10. Where do you get the above information mentioned in no. 8 from?……

……

11. Which source would you prefer to access agricultural information from and why?……

……

……

……..

12. What benefit(s) has access and use of such agricultural information had in your agricultural productivity?

……

……

……

……...

13. What challenges do you face when accessing and using the agricultural information?.....

.....

.....

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.....

14. How do you think the provision of good quality and relevant agricultural information to you can be improved?

……

……

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……

……..

Part three (ICTs and their uses)

15. What ICT devices do you have access to? (e.g. TV, radio, mobile phone etc)……

    ……

    …….

16. For what reasons/purposes do you use these ICTs? (E.g. communication, entertainment, social status, listen to news, conduct business etc.)

……

……

……..

17. Do you think there are problems with access and use of ICTs in provision of information on agriculture to rural farmers?

- Yes
- No

18. If yes, what problems? (e.g. high cost of the facilities, Inaccessibility, Lack of skills to use them, Lack of relevant infrastructure, Lack of awareness, Language barriers

    etc)……

    ……

    ……

    ……

    ……

19. Suggest ways in which the above problems can be tackled/solved

    ……

    ……

    ……

    ……

20. Are you aware of any information programme(s) in any ICT which provide information on agriculture?

    - Yes
    - No

If Yes, which ones?

……

……

……..

21. Please suggest ways in which ICTs can be used to enhance information access……

    ……

    ……

    …….

APPENDIX C: INTERVIEW SCHEDULE FOR KEY INFORMANTS

Designation ……..

Q1. What ICT facilities/infrastructure are available in this locality?

……

……

……

Q2. For what purpose (s) are these ICTs used for?

……

……

……

…….

Q3. How can you describe farming practices in this area (Lower Yatta District?)

……

……

……

……..

Q4. What challenges do you think rural farmers in this locality face?

……

……

……

…….

Q5. Do you think provision of relevant and timely agricultural information can help farmers tackle some of the challenges you have highlighted above?

- YES
- NO

Q6. If YES, how do you think this information can be availed to farmers?

……

……

……

Q7. What policies/programmes have you put in place/thinking to put in place to provide agricultural information to the rural farmers?

……

……

……

Q8. How aware are the rural farmers of the agricultural information availed in various channels?

- Very aware
- Fairly aware
- Not aware at all

If they are not aware of the information available, what steps are you taking to make them aware?

……

……

……

APPENDIX D: Interview schedule for rural farmers (Before pilot study)

Part one (Personal Information)

1. Location: ……
2. Gender:
   - □ Male
   - □ Female
3. Age:
   - □ 18 -28
   - □ 29 -39
   - □ 40 -50
   - □ Above 50
4. What is your highest level of education?
   - □ University/tertiary/college
   - □ Secondary
   - □ Primary
   - □ No education/schooling at all
5. What is the size of your farm? (Acres/number of animals)
   - □ Less than 5 (Small scale)
   - □ 5 -10 (Medium scale)
   - □ More than 10 (Large scale)

Part two (Information needs)

6. What are your agricultural information requirements?

    - Farm inputs
    - New technology
    - Crop/animal diseases
    - Soil types and fertility
    - Crop management
    - Meteorology
    - Weather patterns
    - Post harvest technology

Others (Please specify) ……..

7. How often do you seek information on agricultural practices?

    - Regularly
    - Sometimes
    - Not at all

8. How do you get information on issues of interest to you?

    - From radio
    - From TV
    - From newspapers
    - By word of mouth (i.e. from friends, relatives etc.)
    - From chief's barazas
    - By reading posters

Any other ……

9. Do you require any agricultural related information?

    - Yes
    - No

If YES what type of information do you require?

……

……

……..

10. What channels/media do you receive the above information through?

    ……

11. Which channels/media would you prefer to access agricultural information from and

    why?……

    ……

    ……

    ……..

12. What impact has it had in your agricultural productivity?

……

……

……

……...

13. For what purpose(s) do you use this agricultural information?

    - Good harvests/produce
    - Prevent crop/animal diseases

- Improve sales
- Enhance production
- Forecast production

Any other (please specify) …….

14. How do you think the provision of good quality and relevant agricultural information to you can be improved?

……

……

……

……

……

……..

Part three (ICTs and their uses)

15. Which of the following items does your household have?

- TV
- Radio
- VCR
- Mobile phone
- Computer
- Fixed-line telephone
- Fax machine
- Internet

Any other ……

16. For what reasons/purposes do you use these ICTs?

- Communication
- Entertainment
- Occupation
- Education
- social status
- Listen to news
- Conduct business

Any other ……

17. Do you think there are problems with access and use of ICTs in provision of information on agriculture to rural farmers?

- Yes
- No

18. In your opinion what problems/constraints have led to lack or low usage of ICTs by the rural farmers in this area?

- High cost of the facilities
- Inaccessibility
- Lack of skills to use them
- Lack of relevant infrastructure
- Lack of awareness

- Language barriers

Any other ……

19. Please suggest ways in which ICTs can be used to enhance information access

    ……

    ……

    ……

    ……

20. Are you aware of any information programme(s) in any ICT which provide information on agriculture?

    - Yes
    - No

If Yes, which ones?

……

……

……..

Do you access them?

- Yes
- No

If YES, what benefits do you derive by accessing such information?

……

……

……