

EFFECTIVENESS OF INFORMATION AND COMMUNICATION
TECHNOLOGY IN DISSEMINATION OF AGRICULTURAL
INFORMATION ON INPUT DELIVERY AMONG ARABLE CROP
FARMERS IN EKITI STATE.

BY

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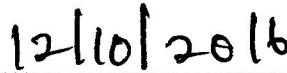
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DECLARATION

I **IBIYEMI KEHINDE VICTORIA** hereby declare that this project “Effectiveness of information communication and technology in dissemination of agricultural information on input delivery among arable crop farmers in Ekiti state” has been written by me and that it is a record of my own research work. It has not been presented before in any previous application of a degree or any reputable presentation elsewhere. All borrowed ideas have been duly acknowledged.

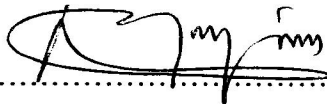


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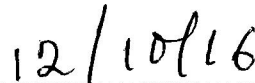


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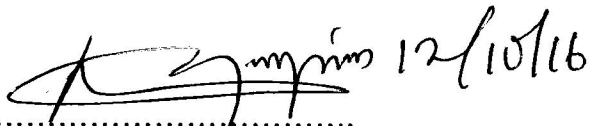


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CERTIFICATION

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DEDICATION

This project work is dedicated to the Almighty God (the ever available God), my unforgettable late father Mr Olaniyi Ibiyemi, and may his gentle soul rest in perfect peace. (Amen), my ever supportive mother Mrs F.F Ibiyemi, for her assistant, love and care. Thank you for everything you have done for me. I love you mum.

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ABSTRACT

The study attempts to investigate the level of awareness, access and effectiveness of information and communication technology (ICT) tools among arable crop farmers in Ekiti State, Nigeria. Data were gathered through a questionnaire scheduled on a total of 90 arable crop farmers. The data were analysed using frequency, mean, standard deviation, correlation coefficient and independent sampled t-test. The result revealed that, the mean age of the respondents was 50.5 years and mean years of farming experience of 37.3 years. Radio, television, telephone, were mostly used. These ICT tools were moderately effective to arable crop production in the study area. . Based on the result of independent sampled t-test, there were significant differences in the mean scores in access and usage ICTs. Sequel to the findings of the study, it was recommended that, the extension institutions in Nigeria should concentrate their effort on agricultural information delivery through these ICT facilities accessible to arable crop farmers in order to improved arable production in the study area.

Key words: Information and communication technology, effectiveness, arable farmers, input delivery, Nigeria.

CHAPTER ONE

1.0 INTRODUCTION

Information and communication technologies (ICTs) are new technologies that cannot be ignored in Africa especially for development in all sector agriculture inclusive. This is because, ICT is one of the main driving forces that can bring about development and change in this present digital age. It was in the light of this that Emenari (2004) noted that, the great transformation in the lives of the people especially in the developing countries depends on advances ICTs. The rapid development of ICTs continues to have major influence on the livelihood of people across the world. Social research has shown that, adoption of ICTs can be a major fuel for economic and community development in rural areas (Osiakade et al., 2010). As noted by Onwubalili (2004), "the tremendous changes are quite glaring in every facet of our lives and touches simplest of domestic services to corporate and limitless industrial applications".

ICTs such as Internet could create and meet demands which satisfies human and corporate needs at all times and levels (Nwajinka, 2004). Infact, ICTs are what rural dwellers need to climb to the heights developed continent had reached. The recent development in ICT has broken national and international barriers and turned the world into a global village, making

information available to everyone, everywhere and at any time it is needed (Onasanya et al., 2011). Then one could ask what is ICT?

According to the Food and Agriculture Organization, FAO (2003) ICTs was defined as those technologies used in collecting, processing, storing, retrieving, disseminating, and implementing data and information using microelectronics, optics, and telecommunication and computers.

According to Adebayo *etal* (2007) ICT is defined as a tool and process used in assessing, retrieving, storing, organizing, manipulating, producing, and exchanging information by electronic and other automated means. Other definitions by CTA (2003) identified ICT as a technology that facilitate communications as well as the processing and transmission of information by electronic means. This includes the internet, wireless networks, cell phones, radio, television and other communication media

The advantages of Information Communication Technologies (ICTs) are numerous such as they have changed the lives of individual, organization and the world at large. It is not an understatement to posit that no country and communities have been left on the same plain with the current form information are churned out per milliseconds in the world today. The value of information can never be overlooked because upon it lies the bedrock for decision-making. Information can be said to be figures, facts, graph, images,

that are processed and organized into meaningful form, it can be said to be **message from a sender to one or more receivers** (Claude, 1998).

Based on the aforementioned about the importance of information to the world today and the affirmation that the internet is the eighth wonder of the world, it is a truism that ICT have affected the every facet of human existence. ITU (2014) for example approximate that 8 out of 10 Internet users owns a smartphone, information and data are increasing by leaps and bounds. The growth is more rapid especially in developing countries because every human activity ranging from the top managerial position down to the clerical staff engage the use of these technologies. The most recent authoritative data released in 2014 shows "that Internet use continues to grow steadily and at 6.6% globally in 2014 (approximately 3.3% in developed countries and 8.7% in the developing world). In line with this findings one can infer that the number of Internet users in developing countries has doubled within the space of five years (2009-2014), with two thirds of all the human population living in the developing countries having a strong online presence.

However, the hurdles are still large. ITU (2014) affirms that out of the 7.6 billion people in the world today, 4.3 billion people are yet to assess the internet, more tragically is that 90% of these delineated people lives in the

developing countries. Stressing the problem further reports shows that 42 Least Connected Countries (LCCs) homes almost 2.5 billion people. Therefore making ICTs out of reach particularly among these countries. Among the underlying factors impeding on the use of internet is the remoteness of the area although this is an argument that is still subjected to debate. ITU posited that ICT is yet to penetrate the remote areas of some countries. This includes the availability of telephone lines thereby affecting coverage and other forms of electronic transmission of data.

Favourably, there have been a tremendous effort to reduce the number of people without access to the Internet and mobile coverage but findings by ITU shows that more has to be done to achieve the 2015 deadline for the attainment of the Millennium Development Goals (MDGs) agreed by world leaders in the year 2000 stating that a progress in ICT lies the power to fasten the attainment of the MDG's because the world in itself has become a global village and hence there is ease in passing information around the world and among the people.

In more recent years, information and communication technologies has provided the society with a vast array of new communication opportunities. For example, people can communicate in real-time with other users in

different countries of the world using technologies such as instant messaging, **face booking** and video-conferencing. Thereby lending more credence to the **use of Social networking** websites such as Facebook which allow users from **all over the world** to remain in contact and communicate on a regular basis

In other not to be cut out from the new move on ICT the Nigerian government has decided to re-focus its stands on agriculture through the recognition of modern technologies in disseminating and extending information to the farmers that need them. The stage is fully set to encourage the use of Information and Communication Technology (ICT) to boost agricultural production in Nigeria. The advent of ICTs has made the world a global village through the process of globalization. This means bringing the world to individual's doorsteps irrespective of the distance. This implies that those in the rural areas are not exempted. The technology involves the use of computer, internet, radio television and telephone to create, communicate, organise, store, retrieve, disseminate and manage information. In the field of Agriculture, however, only those in research institutes and some offices in the universities and colleges of agriculture have integrated the technology in disseminating information to the target audience or intended beneficiaries thereby neglecting the rural farmers who are the main producers of food

crops in Nigeria out of the business of the modern technology. Therefore, **there is need** for a drastic measures as regards to inculcation of ICT in **agriculture**. These measures are intervention laden with the potential to **ensure** that knowledge and information are an important boost agriculture **methods and practices** if put into the right use by farmers.

Although there is need to emphasise that the use of these modern technology must be user friendly. (FAO, 2008) Information technology use refers to the extent to which the technologies are utilized for communication purposes. It also explains the level to which the potentialities of the technologies are harnessed for the information generation. Many agrees that information is central to the development and vast amounts of promotion of agricultural sustainability (FAO, 2008). Information and communication technology (ICTs) increase resources for information exchange and also improve the access to and benefit from development activities for the rural poor; as well as creating a more informed policy environment (FAO, 2008).

ICT enables vital information flows by linking rural agricultural communities. Attempt to understand and explain the mechanism and constraints of technological innovation adoption is not new. Therefore **effectiveness** of information and communication technologies in **dissemination** of agricultural information to rural areas has been a challenge

therefore needs to improve. This study is a timely call with great importance to restructure and reposition the use of ICT in input delivery among arable crop farmers in Ekiti state with the intention of tapping into the potentialities of engaging the use of this eighth wonder of the world.

1.1 STATEMENT OF PROBLEM

The use of information and communication technologies is relatively new when compared to the traditional way of disseminating information. (Arokoyo, 2005) argues that in many developing countries of the world it is typical to extend agricultural messages through conventional means such as the use of local radios, drama, and role play. However, there have been effort geared towards introducing modern technology in the process of information exchange but unfortunately this channels of exchange has not been maximally exploited (Lobo, 2007). Hence there is need to explore the effectiveness of these modern technologies in the training and diffusion of the appropriate message to the farmers.

Also although there have been substantial recognition in the use of ICT in recent times in disseminating agricultural messages to farmers but one strong argument against its use is its complexities and the distortion in the message been passed down to the rural farmers, therefore may limited the role ICT plays in enhancing agricultural productivity. As a result of this, the researcher

intends to find out how these messages can be simplified and communicated using this modern technology in the delivery of input to arable crop farmers in Ekiti state, Nigeria.

The foregoing therefore raises the following research question as to:

- What kind of information are most necessary to the arable crop farmers?
- What kind of information is disseminated to arable crop farmers through ICT?
- How effective is ICT in dissemination of information on input delivery?

1.2 OBJECTIVES OF THE STUDY

The main objective of this study is to assess how effective ICT has been in the dissemination of information on input delivery among Arable farmers in Ekiti State. While the specific objectives are:

- describe the selected personnel characteristics of the arable crop farmers
- identify the types of ICTs used by the arable crop farmer
- assess the arable crop farmers accessibility of ICT.

- identify the factors that influence the utilization of ICTs and constraints to ICTs use by the farmers.

1.3 RESEARCH HYPOTHESIS

Based on the objectives above, the hypothesis that guide this study is therefore stated as follows

HO: There is no significant relationship between the effectiveness of ICT usage among arable crop farmers and selected socio-economic characteristic.

HO: There is no significant relationship between the effectiveness in use and constraint to ICT

HO: There is no significant difference between the accessibility and usage of ICT.

HO: There is no significant relationship between selected socio-economic characteristics and effectiveness of ICT usage in input delivery among arable farmers in Ekiti state.

1.4 JUSTIFICATION OF THE STUDY

Nigeria is endowed with massive agricultural lands and it is needless to say that agriculture has been the mainstay of the economy since independence. Hence in the bid to strengthen and encourage the sector, the Nigerian

government has recognised the importance of ICT as a good tool that can be used to improve the neglected agricultural sector. This act propelled the enactment of policies such as the GES scheme by the former minister of agriculture Dr Akinwunmi Adesina whose sole vision was to use modern technologies such as GSM phones to disseminate information to over 10 million farmers in order to improve their output (Punch Newspaper, 2012).

Furthermore, the scheme guarantees registered farmers e-Wallet vouchers with which they can redeem fertilisers, seeds and other agricultural inputs from agro-dealers at half the cost, the other half being borne by the federal government and state government in equal proportions.

The Growth Enhancement Support Scheme (G.E.S) is one of the many critical component of Federal Government Agriculture Transformation Agenda (ATA). It was designed for the specific purpose of providing affordable agricultural input like fertilizers, and hybrid seeds to farmers in order to increase their yield per hectare and make it comparable to world standard.

This goes to show the direction the nation is looking and the relevance of ICT today in the twenty first century. In the same vein, there have also been an establishment of the Information and Communication Support (ICS-Nigeria)

in 2002 and other policies among others (Oladimeji, Osamu and Funlchi, 2004).

Therefore this paper seeks to identify the gaps in the use of ICT in the dissemination of input delivery among arable farmers in Ekiti, Nigeria and also seeks to explore and proffer possible solutions that will contribute to knowledge on how to address these various problems.

1.5 PLAN OF THE STUDY

The remaining part of this study includes the following: Chapter two presents the review of relevant literature for the study. Chapter three presents the methodology. Chapter four presents the results and discussion while chapter five presents summary, conclusion and recommendation for the study.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

The use of ICTs - radio, television and telephones, has accelerated agricultural development by improving access to information and knowledge services. From the perspective of Agricultural Knowledge and Information Systems (AKIS), ICT can be seen as a useful tool in improving linkages between research, farmers and agricultural extension systems (Balaji *et al.*, 2007). Sife *et al.* (2010) described ICTs as an effective tools used for the provision of information as it allows a two way communication and can provide more than one services at a time.

Information and Communication Technologies are proving new approaches for communicating and sharing information. By using such kind of technologies, it will improve the knowledge and skills of individuals (Warren, 2002). ICTs has increased priority and resources for information exchange have the power to improve the access to and benefit from development activities for the rural poor; as well as creating a more informed policy environment (FAO, 2003).

Information and Communication Technology (ICT) in the agricultural sector **facilitates** knowledge sharing within and among a variety of agricultural **networks** including researchers, importers/exporters, extension services and **farmers**.

ICTs are real source of information and knowledge for people including farmers and it reduces the distance among different communities of the world (Herselman, 2003). ICT represents the formation of knowledge in rural areas of the developing world which can share the knowledge and information effectively harvested for agricultural and rural development.

The use of ICTs have played a very effective role in the agriculture development and in the decision making of farmers in different countries and helps in increasing the efficient productivity and sustainability of small scale farmers through greater interaction in communication, evaluation, production and sharing of useful information (Cash, 2001; Galloway & Mochrie, 2005; Opara, 2008; Taragola & Van Lierde, 2010). The ICTs have brought significant changes in agricultural development and transfer of information and knowledge through various technologies among farmers (Birkhaeuser, Evenson, & Feder, 1991). Information and communication technologies have the potential to disseminate the agricultural systematic information among smallholder farmers similarly through the mobile phones, Television,

Internet and radio and have the facility to transfer related and timely information that helps to make decisions to use resources in the most productive and profitable way (Ekbia & Evans, 2009; Ommani & Chizari, 2008). Last two decades information and communication technologies (ICT) in agriculture and rural development have spread very fast in all sectors of the society and also played vital role in rural development, recently ICT has given significant results in almost all areas of rural life (Fawole & Olajide, 2012).

The effective distribution of ICT can increase agricultural attractiveness by production, transaction costs, raising production, input delivery, efficiencies and farmers' incomes, by providing more information and value to stakeholders (Rao, 2007).

In recent years, ICTs have been introduced in agriculture projects which have provided fruitful results in rural and agriculture development. For instance information and communication technologies can be used for distance learning programs and help the farmer for learning new approaches and technologies for the use of agriculture development in developing countries. Such kind of technologies can provide information on weather, prices, input delivery and profitable income. It was showed that farmers who have used the Information and Communication Technologies in agriculture have

increased their production information and knowledge (B.Sideridis, 2010). Similarly those who have used the e-services, e-commerce applications also increased their income (Chapman and Slaymaker, 2002).

2.1 ICTS APPLICATIONS IN AGRICULTURAL DEVELOPMENTS

ICTs plays essential role in poverty alleviation and have been identified to be a powerful tool in combating global food crisis. It provides useful strategies to transmit agricultural information to the rural areas where largest percentage of the farmers resides.

Farmers need information to enhance agricultural production. Such information however should be accurate, complete, dynamic, concise, and must be in user friendly form (Nkwocha, et al., 2009). Aina (1991) and Kaniki (1995) opined that each agricultural information user usually have specific information needs based on their peculiarity. Some farmers need information such as sources of credit facilities, assess to farm input, issues on land-ownership, input and marketing of agricultural produce and these are quite different from those of extension agents which include control of major pests and diseases, proper handling of insecticides and best cropping methods, it also connect smallholder farmers to knowledge, networks and

institution, disaster management and early warning system, food safety and traceability.

2.2 ICTS AND AGRICULTURAL DEVELOPMENT IN NIGERIA

The use of ICT has become part of the development of a country in this 21st century. Okwusi et al. (2009) suggested that the ways government can make impact in ICTs for agricultural development is by the establishment of phone booths and cyber cafes in rural and urban areas for agricultural purposes.

There is need to set up agricultural community ICTs centres which will be operated by farmer organizations. There is immense potential for technological development in Nigeria due to the resources the country is endowed with. The opportunities available for the use of ICTs in agricultural development in Nigeria are numerous and similar to those of economic development of the country if appropriate measures are taken.

ICTs usage has become more relevant in the modern days and agriculture is one of the sectors that benefited from it. ICTs has played an important role in addressing some of the challenges facing agriculture and in the uplifting the livelihoods of the rural people. ICTs are used for the delivery of agricultural information and knowledge services (i.e. market prices, extension services, etc.). It has been used as a means of accessing market prices, weather and

other advice (WSIS, 2003). It enables rural communities to interact with other stakeholders, thus reducing social isolation. The role of ICTs in improving rural livelihood was officially recognized and endorsed at the World Summit Information Society (WSIS, 2003). This includes the use of computers, internet, geographical information systems, and mobile phone. ICTs provide better access to credit and rural banking facilities and input delivery.

2.3 ROLES OF ICTS IN AGRICULTURE

Since the coming of the era of information & technology, ICT has played a great role in our society. The information Communication technology revolution has brought huge changes in both social and economic development in our world (Adesope, 2009).

Agriculture just like other sector has benefited from ICT revolution and the latest innovation in ICT has expanded the development of agriculture sector in different form. In large part of the world over millions house hold own TV and mobile phone which are used as the source of information to people in village and in the big cities, the use of ICT in agriculture range from advanced modern technologies, such as GPS navigation, satellite

communication, and wireless connectivity, to older technologies such as radio and television.

However, the rural people still lack basic communication infrastructure in accessing crucial information in order to make timely decisions. The application of ICT in agriculture generates possibilities to solve problems of rural people and also to promote the agricultural production by providing scientific information timely and directly to farmers. Here are some benefits of ICT in agriculture

- Introduction of mobile phones has brought about a tremendous change in agriculture sector resulting into dramatic improvement in the efficiency and profitability of the agriculture industry. The spread of mobile phone service allow farmer to land their product timely and directly to the market where wholesalers are ready to purchase them without presence of middle man (ITU 2007).
- Radio and television has been another input in communication technology used widely by many farmers, they have been used by farmers, entrepreneurs, extension workers and other stake holders to disseminate information on various innovation in agricultural technology.

- The internet is also an emerging tool with potential to contribute in agriculture sector and in rural development. Internet enables rural communities stay up to date and to receive information about the market and other necessary information in the industry. Internet can facilitate dialogue among communities and help to share information between government planners, development agencies, researchers, and technical experts (Berman, 2008). The Internet has proven valuable for the development of agriculture in developing countries like Tanzania.

2.4 TYPES OF ICTS USED BY THE ARABLE CROP FARMERS

2.4.1 Telephones and mobile phones

The telephone system is not only a fundamental communication infrastructure but also a basic facility which supports the use of other technologies. For example, in some African areas, the telephone was the only ICT tool used by most farmers (Bertolini, 2004 Munyua, Adera & Jensen, 2008). Its advantages included adaptability and the capability of transferring both voice and data at gradually decreasing cost (Mangstl, 2008).

Additionally, mobile communication technologies have become gradually more important in many parts of the world in improving the delivery of

information about agriculture input (Munyua, Adera & Jensen, 2008). These communication devices present several advantages such as portability, wide range of coverage and instantaneous two-way communications. Furthermore, the availability of state-of-art technologies, which are now integrated into mobile phones, has further improved communication. Built-in global positioning systems (GPS), high-resolution digital cameras and short-length video recorders are exemplary embedded technologies. These advances facilitate the use of mobile phones for sending and receiving voice, text, image and video information (Munyua, Adera & Jensen, 2008). In addition, most respondents in Hassan *et al.* (2008) study claimed that telephone and mobile phones have become ubiquitous. Other studies have found that mobile telephony is regarded as the most successful ICT tool used in attempts to develop the global agricultural sector (Mangstl, 2008).

Mobile telephones have been used by farmers for a variety of purposes. For example, Jensen and Thysen (2003) reported that short message service (SMS) was used to obtain required information, such as weather information and suitable time to spray pesticides. Besides information delivery, the mobile phones can be applied to specific other purposes such as transferring money from one bank account to another for labour payments and input

purchases in Kenya (Hafkin & Odame, 2002 cited in Munyua, Adera & Jensen, 2008).

Moreover, market information in voice mail formats is delivered to Kenyan farmers (Munyua, etal 2008).

Other research studies have reported that farmers and agricultural experts are sending information as images via mobile phones with a built-in digital camera (Parikh, 2009). This approach saved time and money in addition to providing more support by a limited number of agricultural experts to a greater number of farmers over a larger area.

2.4.2 Networking and/or the Internet

For geographically remote locations, connectivity through computer networks may be an appropriate way the farmers get information. For example, each village centre could communicate with the outside world, nearby villages, other countries or other continents, via several types of communication tools, such as dial-up telephone connections, wireless networks (Munyua, Adera & Jensen, 2008).

2.4.3 TV/radio

The lack of accessibility to other communication technologies and funding **has led to a combination** of broadcasting media which has been used to **deliver agricultural** information in a number of research projects. These

media also work well for people who are not highly literate because they are attractive, easy to understand, especially with visual and animated materials; in addition to needing only modest reading fluency skills. Studies reported that television was the most popular tool in terms of ICT usage (Hassan et al., 2008).

Community radio for broadcasting information has also been widely used in several programmes, both on its own and along with other methods (Kweku, 2006 cited in Munyua, Adera & Jensen, 2008). With the popularity of radio broadcast, it is also reported that the radio is not only one of the top four widely used ICT tools but its importance also has increased in delivering input to rural people. (Hassan et al., 2008; Munyua, etal 2008).


Radio has been used to broadcast useful agricultural content. For example, discussions related to agricultural problems and solutions have been broadcasted in Ekiti State radio stations. This was found to be useful for the target audiences

Radio has been used to broadcast in multiple languages in many areas; for example, in Nigeria English and several local languages, such as Hausa, Igbo and Yoruba, were used in broadcasting radio programs along with television programs (Ekoja, 2004). Using radio to report produce prices in local languages is another example of successful radio use in Ekiti State.



2.4.4 VCD/DVD


Agricultural knowledge also can be transferred through learning modules in offline Compact Disc Read-Only Memory (CD-ROM) format. This format of knowledge transfer has been recommended for use by illiterate farmers without the need for assistance from others (Sujhi *et al.*, 2009). This stimulates self-learning activities and also reduces dependency on technical staff for learning new agricultural knowledge and technologies.



Moreover, not only text information can be included in CD-ROM but also other types of data like pictures, audio and video clips (Sujhi *et al.*, 2009). This advantage helps to overcome the illiteracy problems hindering further learning by poor farmers in rural areas.

In addition, it is a solution to the problem of agricultural knowledge dissemination in areas where there is no Internet connectivity or the connection is unreliable (Rao, 2007).

2.4.5 Computer




Computers are used for keeping records such as budget information, farm equipment inventories and animal health forms. Farmers often use global positioning system (GPS) receivers to electronically map factors and areas that might affect crop yield, such as wet spots and weed patches.




2.5 ACCESSIBILITY OF ARABLE FARMERS TO ICTS

Access of farmers to technology plays a vital role within the agricultural sector in Africa, and the use of Information and Communication Technologies (ICT) on rural farms is no longer an exception (Lin, 2005). Within the last decade, the number of mobile subscribers in Nigeria has steadily increased, transforming the way farmers are cultivating their fields and selling their products.



ICTs are essential for arable farmers and their food production, as agriculture remains the backbone of the vast majority of economies in the region and the livelihood of the rural population. Therefore, sufficient and continuous investment is needed to empower rural farmers and provide them with reliable infrastructure such as proper network coverage, in order to get them connected.

2.6 FACTORS THAT INFLUENCE THE UTILIZATION OF ICTS BY THE FARMERS



Basically, there are few reports investigating the use of other ICT in agriculture. The technology acceptance model (TAM) suggests that there are a number of factors that influence the utilization and use of technology. These are external factors, perceived usefulness and perceived ease of use. Perceived usefulness is the degree to which using technology would improve

performance and perceived ease-of-use is the degree to which using technology is expected to be effortless (Lu, etal 2003). In agriculture, the use of ICT can be influenced by a number of different factors, such as type of farm enterprise, farmer's permanent characteristics, farm characteristics, goals and community culture. These factors have direct and indirect relationships and influence the use of ICT either positively or negatively.

Certain characteristics of farmers such as:

- Education,
- Age
- off-farm work
- farm size and
- Gender are also important variables in explaining the use of computers.

Some of the factors identified in previous studies (Sabuhoro & Wunsch, 2003) are as follows:

- **Age:** It is anticipated that the age of the farmer is negatively related to the use of ICT, and the probability of ICT use decreases with increasing age. The younger the farmer, the more likely is the use of ICT.

- **Farm size:** The size of the farm is expected to have a positive relationship with the ICT uptake. Larger farms tend to be earlier users of technology than smaller farms.
- **Education:** Use of technology is believed to be positively associated with education. Those farmers with post-high school qualification tend to make up the majority of ICT users.
- **Off-farm income:** Farmers with off-farm income are likely to use ICT than those in full time farming. The probability of ICT use is expected to increase if the farmer has off-farm employment.
- **Gender:** The probability of ICT use is likely to increase if the farmer is female. This depends on the geographical context. In most African countries where women are not yet as fully emancipated as their Western counterparts and are expected to stay at home. Therefore, men have more and easier access to ICT and more readily adopt technology.
- **Barriers to ICT use:** The anticipated barriers to ICT use such as lack of ICT training, high technology costs, lack of technical know-how and lack of education affect the ICT use negatively. The higher these barriers are, the less the probability of ICT use.

- **Farming experience:** The farmer's experience in agriculture is expected to have a positive relationship with ICT use. Those farmers with more farming experience tend to use technology than those with less experience. This also depends on other factors such as the age of the farmers. Some experienced farmers are more likely not to be flexible and prefer their own traditional way of practising farming.
- **Income:** Those with less annual /monthly income are often the ones with the least access to ICT. The higher the income levels, the higher the probabilities of ICT use.
- **Distance from centre of development:** Those located close to the centres of development are expected to have greater access and use for ICT than those far away.
- **Household size:** A large household size is generally associated with a positive influence on ICT use than a smaller household size.
- **Attitude:** Positive attitude towards ICT is likely to generate a positive effect on ICT use and a negative attitude implies otherwise.

2.7 CONSTRAINT TO USE OF ICT BY ARABLE CROP FARMERS

This section presents issues that pertain to the barriers to ICT use and the **factors** affecting the use of ICT in Ekiti state.

Despite efforts by commercial farmers to apply ICT in their farming practices, the majority poor farmers in rural communities 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. Some of the constraint are discussed 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 countries. According to Guermazi and Satola (2005), the infrastructure investment needed for the uptake of ICT far exceeds the resources of most countries and is prohibitively expensive or not commercially viable. ICT infrastructure that is in great need of reform because of its poor shape. The country lacks communication facilities and the main efficient form of communication remains the radio. 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 and wider business networks (Galloway & Mochrie, 2005). This situation is not favourable since the majority of the world's poorest people dwell in the rural and poor areas, where there is little or no ICT infrastructure.

- **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 countries. Guermazi and Satola (2005) found that most countries have the lowest access to ICT resources and within these countries; there is a notable digital divide between the rural and urban areas, the rich and the poor

population. The inaccessibility of ICT makes it difficult to share information across traditional barriers and to give a voice to traditionally unheard people. Rao (2008) noted that most countries lack access to modern technology like computers and Internet. Though the use of computers is improving, Internet connectivity is still extremely poor, affecting the access to information and the ability to make informed decisions by farmers (Maru & Ehrle, 2007). 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 (2008), even when infrastructure is available, affordable access is a concern. Personal computers, faxes, printers and some ICT equipment are expensive and unaffordable to the majority of developing countries inhabitants, even for middle-class families, thereby cutting down the populations who are able to use the technology (Fors & Moreno, 2009). The

initial costs of ICT and the ongoing expenses of maintaining them are very high and a number of people cannot afford it (Galloway & Mochrie, 2005).

Among the main obstacles affecting ICT effectiveness is the price that is charged to end- users by ICT service providers for ICT access. For example, the price of Internet provision encompasses a number of costs that are later passed on to the end-users, thereby exacerbating the charges to the Internet users. As a result, a lot of potential users are barred from using the Internet because of the high costs.

- **Lack of ICT awareness and training**

With the greatest percentage of illiterate people in the State, ICT face a tremendous challenge to be effectively used by the communities. 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 Ekiti State, a major barrier in the use of ICT for input delivery is the lack of local and community related content as well as content in local languages. It is noted that the State faces a problem of inadequate locally owned, published, adapted knowledge and content to satisfy the needs of its people (Rao, 2004; Mangstl, 2008). Most of the content on the web is not relevant to the indigenous people of the State. Therefore, there is need for digital information content that is relevant to the communities in the state, to cater for the needs and requirements of different consumers and communities. ICT can only be useful and meaningful to support people-centred participatory development; particularly to the arable farmers 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. 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, 2002:150). 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.

- **Attitudinal barriers**

In addition to all the other barriers, attitudinal barriers as a contributing factor inhibiting the use of ICT. Attitudinal barriers are mainly cultural and behavioural attitudes towards ICT pertaining its appropriateness, usefulness and relevance (Kabede, 2004:274). These may discourage the use of ICT even if all the other facilities for ICT use are available. An example of attitudinal barriers include beliefs in some societies such as, computers are for intelligent people or for males and the young only. Some even believe that ICT are difficult to use or they belong to the rich class or white culture. The list is endless, but these are some of the beliefs that hinder the use of technology in some societies in Africa.

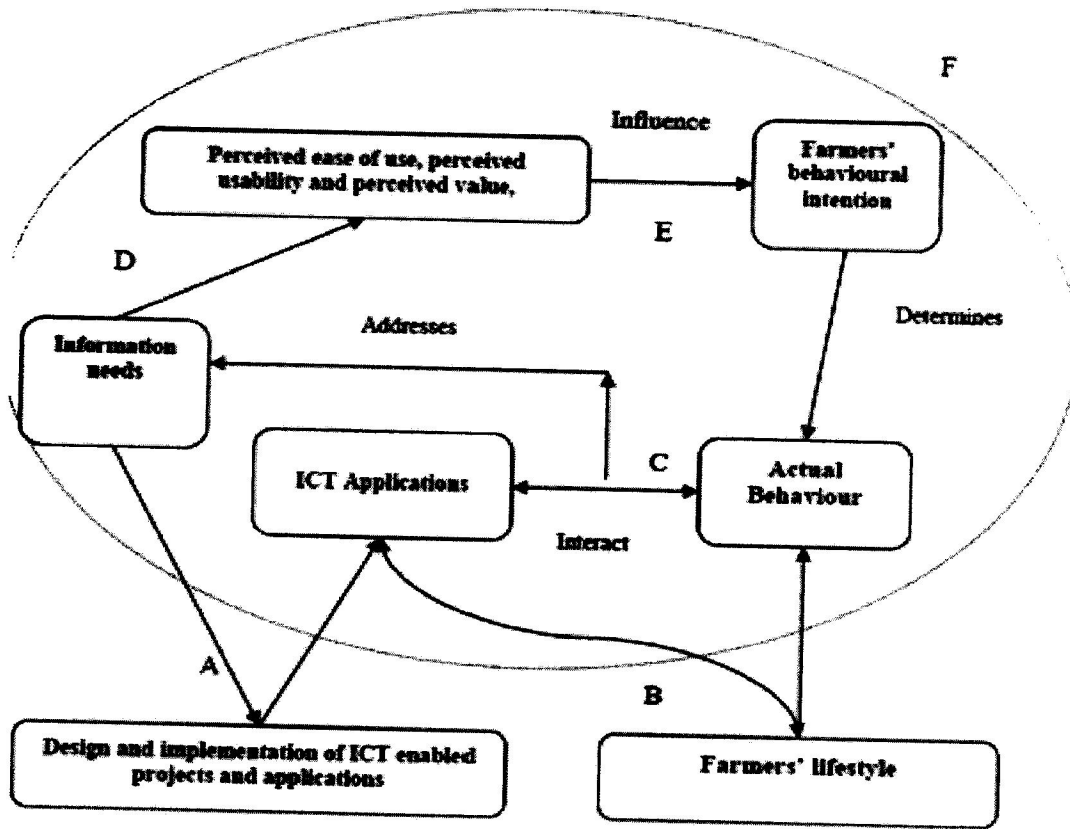
2.8 CONCEPTUAL FRAMEWORK OF THE STUDY

The conceptual framework of this research has got four basic facets:

- I. ICT applications are designed and introduced to meet certain information needs of the target users (i.e. Arable crop farmers).
- II. **Farmers' use of ICTs is intertwined with social practices and their lifestyle.**

- III. Farmers interact with the ICT applications and they develop perceptions through such engagement. The whole process is part of the circle F.
- IV. Farmers' use of ICTs is a dynamic process. Through a longer duration of use, farmers can get more comfortable with the use of the ICTs, they can explore new applications and develop innovative ways to gain benefits. Farmers integrate ICTs in their lives through a process of appropriation of the technologies.

These four facets along with the corresponding relationships among different agents are examined in detail below:



Source: Bidit Lal et al, 2008.

A is the social shaping of technology (Edge, 1995). Like all other technologies, ICTs are designed to cater the needs of particular groups. They are shaped by social forces such as the needs of those who pay for their development, and the assumptions of the technologists who develop them. Most mobile telephony devices and services have been designed to meet the

needs of businessmen or teenagers in western cities. The problem here is to understand better farmers' needs, before starting to design ICT applications.

While society and technology shape each other, individuals also make use of a technology according to their lifestyle. It is also important to understand the appropriation of technology – how individuals are likely to use technologies and with what (intended or unintended) consequences in different conditions (Wiredu, 2007).

The cycle through which the farmers appropriate ICTs into their lives have been taken from the Technology Acceptance Model (TAM) (Davis 1989), the Theory of Reasoned Action (Fishbein and Ajzen, 1975) and the Theory of Planned Behaviour (Ajzen, 1991) their emphasis on perceived usefulness and perceived usability as determinants of the users' behavioural intention to use a technology. Most TAM studies use quantitative tools to find and validate factors determining behavioural intentions.

However these take a snapshot of perceptions, and do not allow for changes over time, as people learn to use a technology (increasing perceived usability) and discover new benefits or costs (changing perceived usefulness). Snowden et al (2006) have used action research approach to assess the technology acceptance for m-commerce. They argue that it is equally important to find

how practitioners can intervene to positively affect the acceptance and therefore the adoption of new technologies.

This is particularly necessary when the potential users are not much aware of the technological applications. That is one of the reasons we have modelled the technology appropriation process as a cycle. As farmers interact with the mobile phones and telecentres, they gradually learn how to use this technologies to help their farming, improving subsequent interactions, until they can integrate these new technologies into their lives.

2.9 SUMMARY

This chapter exposes the great opportunities offered by the use of ICT and the potential of ICT in transforming agriculture. Literature on the use of ICT in agriculture, icts applications in agricultural developments, icts and agricultural development in Nigeria, types of icts use by arable farmers in Ekiti state, role of ICT in agriculture, factors that inhibiting the use of ICT in agriculture and the conceptual framework of the study.

The next chapter presents the research method used in this study. A description of the location of study and data analysis techniques is also presented in this chapter.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

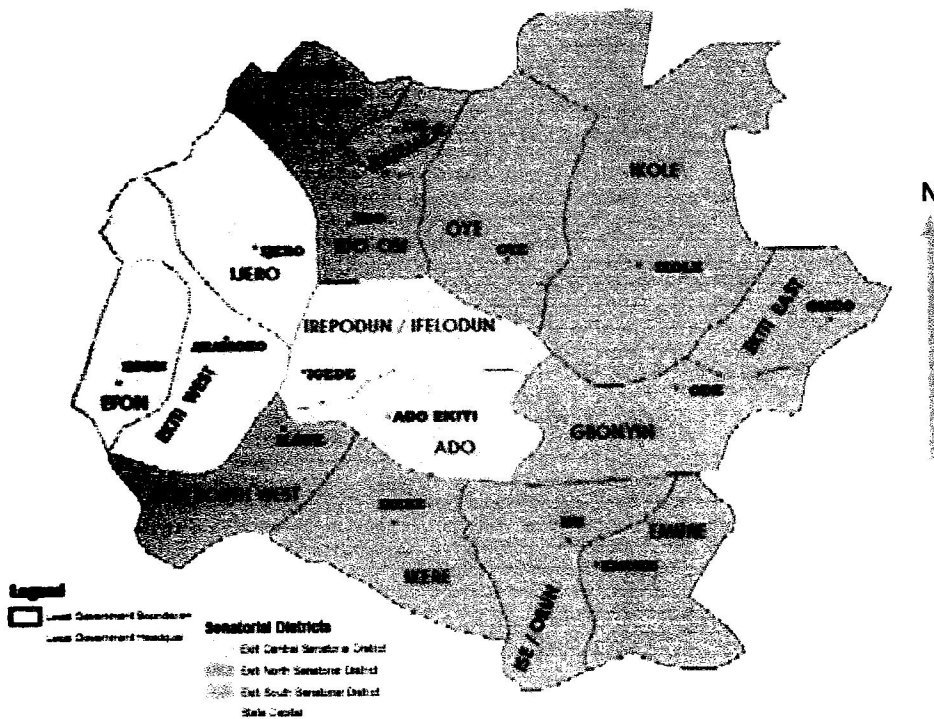
This chapter highlights the details of the relevant and appropriate research method adopted for this study. Explanations are provided as to how and where the research was carried out. Descriptive details of the location of study, the sampling procedures, the data collection methods and techniques of data analysis are all discussed in this chapter.

3.1 Description of the Study Area

The study was conducted in Ekiti State which is located in the south-west part of Nigeria. The state lies between the latitude $7^{\circ} 37' 16'' \text{N}$ $5^{\circ} 13' 17'' \text{E}$. Covering a land area of 2,453 square kilometres and having total population of 42, 4340 at the 2012 census. The state enjoys tropical climate with two distinct seasons. These are the rainy season (April-October) and the dry season (November- March). Temperature ranges between 21 degree and 28 degree Celsius with high humidity. The south westerly wind and the north east trade wind blow in the rainy and dry (harmattan seasons) respectively. Tropical forest exist in the south while savanna occupy the northern peripherals.

Suitability of study location: Ekiti was chosen because of high production of arable crops such as yams, maize, rice, beans, sorghum, millet, and wheat c.t.c.

The other reason for the choice of this location is that the area offered the opportunity to investigate the effectiveness of ICT use in dissemination of information on input delivery such as seeds, fertilizers to arable farmers. Farmers responsible for arable crop production are in the same area and setting. This offered up for study the various aspects of ICTs used in input delivery. The location is geographically close and easily accessible.



3.2 Population of the study

The population was composed of Ekiti state arable farmers who use ICT in one way or the other along their input supply chain. They were involved in maize, yam production, processing or marketing, or only in producing the arable crops and then leaving the other processes on the supply chain to the cooperatives or any other middlemen.

The arable crop farmers was included as respondents. For successful dissemination of ICT use in agriculture, the farmers must be willing and able to use ICT in their day-to-day agricultural operations. Farmers make

decisions on the type of ICT to employ and the appropriate ICT suitable for their farm.

3.3 Sampling techniques

Ekiti state has been divided into 2 zones by the Ekiti State Agricultural Development Project (EKSADP) on the basis of cultural and ecological characteristics and administrative convenience of the state. These zones are the Northern and Southern EKSADP zones

Multistage sampling procedures was employed to select arable framers in Ekiti state.

At the first stage, the local government in the 3 agricultural zones of Ekiti state was selected because of the presence of arable crop production in the all the local Government areas.

At the second stage, three community was selected within the agricultural zones and 30 arable crop framers was selected in the zones, making a total of 90 arable farmers.

Simple random sampling was employed at each stage.

3.4 Sample size

Simple random sampling was used to select a total number of 90 respondents who were interviewed for the purpose of the study.

3.5 Method of data collection

Structured questionnaire was administered to the arable farmers to obtain data on selected socio-economic characteristics such as occupation, age, sex, education level and marital status of the farmers of the farmers awareness, access, use of ICTs and effectiveness of ICT usage and constraints to ICT, the types of ICT used, factors influencing ICT access, input and input delivery procurement, constraints of ICT use and role of ICT in input delivery.

The data collection methods were aimed at investigating how ICTs were being used in dissemination of agricultural information each stage along the input supply, in order to establish the effectiveness of information within the arable crop farmers. This study was limited mainly to the effectiveness of ICT in dissemination of agricultural information on input delivery to arable farmers.

3.6 Data analysis techniques

Analysis of quantitative data was conducted with respect to the objectives of the study using the Software Package for statistical analysis (SPSS) version 16.1.

Frequencies and percentages were computed to describe various matters related to ICTs and they were presented in tables and figures to show the differences and options of respondents on which the discussion is based.

Pearson correlation coefficient was used to determine the relationship between the dependent variable and independent variables while t-test was used in analysing the differences the usage and accessibility.

Likert scale was used to measure the farmers' perceptions of the effectiveness of ICTs in dissemination of agricultural information and the frequencies were run to establish the level of perceptions.

3.7 Descriptive statistics

Descriptive statistics were used to make cross tabulations, frequency tables, to calculate averages, percentages, means and correlations among key ICT use variables. To facilitate the analysis, some items on the questionnaire were measured using a Likhert scale of 1 to 4 scores.

3.8 Correlation and t-test analysis

Correlation analysis and t- tests were conducted to identify and find the relationship between ICT use and some variables, and between the variables themselves.

3.9 Measurement of Variables

The dependent variable which is the effectiveness of ICT usage such as Radio, Television, Telephone (fixed and mobile), The Web, search Engines, Cameras, Videos, E-mail, Computer, Scanner, CD-ROM, DVD, Satellite, Fax, Printer and Web Publishing among arable farmers were measured on a four point likert scale such as: very effective (3points), effective (2points), rarely effective (1 point) and not effective (0 point). The maximum was 15 and minimum was 0.

To know the level of effectiveness, total scores for each respondent was grouped into 3 categories: very effective, effective, rarely effective and not effective. The mean score with standard deviation was used to categorise the effectiveness into high, low and moderate. The score of mean plus standard deviation was considered as highly effective, mean minus standard deviation was considered as low and different between high and low was considered as moderately effective

Usage was measured in terms of the frequency of use of a particular ICT facility by arable farmer. That highly used (3), moderately used (2) low used (1) and not used (0). The effectiveness index was the sum of the scores on all the 15 ICT mentioned.

This study considered two sets of variables; dependent and independent variables.

The dependent variable which was effectiveness of ICT use.

Measurement of independent variables includes the following:

Age: Respondents' age was measured in actual years.

Marital status: Measured as married = 1, single = 2, divorced=3, separated=4, widow=5

Years of education: Measured in actual years spent in school.

Sex: This was determined as male = 1, female = 2.

Education: Measured according to the level of formal education attained either primary, secondary, tertiary institution or adult education.

Years of farming experience: This was measured in actual years of planting on the farm.

Training on ICT Received: Categorized into no training and received training.

Awareness of ICTs: Measured in the number of ICTs arable farmers is aware of.

Access to the ICTs: Also measured in the number of ICTs arable farmers had access to.

Source of finance: either equity, loans, cooperatives.

SUMMARY

This chapter gave an outline of the research methodology of the study which **comprises** of the description of the study area, population of the study, **sampling techniques** for the study, sample size, method of data collection, **data analysis techniques**, etc.

CHAPTER 4

RESULT AND DISCUSSION

Socio-economic characteristics of farmers

The mean age of the sampled arable farmers was 50.5 years. Majority (23.4%) of the respondents falls between 45 to 60 years of age. While (58.0%) of the respondents have their ages ranged between 61 to 75 years and (18.6%) were between 76-85 years of age. This finding implies that, majority of the respondents' age category between 45 and 60 years were old. Most of the young able-bodies men and women had migrated to the urban centers in search of better life and older generation is now left on the farm. The implication of this is that the future of agricultural production in the study area is uncertain and arable production may become a thing of the past. The finding collaborate with Farinde et al (2007), Ogunjimi (2012), Ogunjimi and Ajala (2014) that majority of the farmers in Ekiti were more than 45years and above.

Sex

From table 1, majority (62.2%) of the respondents are male while the remaining (37.8%) are female. This findings indicates that, arable crop producers in the study area are male. This implies that, arable production is

male dominated activities in the study area. Although, the assertion of Olayemi et al. (2012) indicated that, women are known to be more involved in agricultural activities than men in Sub-Saharan Africa (SSA) countries. Despite this fact, the activities of men in agricultural production in Nigeria cannot be underestimated.

Marital status

From the same Table 1 it was revealed that, majority (73.3%) of the respondents were married, (6.75%) of the respondent were single, (7.8%) of the respondent were divorced, (6.7%) were separated, while (5.65%) of the respondent were widow. This implies that, majority of the respondents are considered to be responsible to take any rational decisions in the uptake of any innovation.

Years of education

Data reported in Table 1 further revealed that, about (44.4%) of the respondents had primary education while the (38.9%) of the respondent had secondary education, and (15.7%) of the sampled arable farmers had no formal education. This finding tallies with that of Oyekanmi and Okeleye (2007) that, high percentages of farmers in Ekiti are not well educated. This

attribute is expected to influence their perception about ICT awareness and utilization.

Occupation

Data report in table 1 shows that about (63.3%) of the arable farmers have been mixing trading alongside farming and (36.75%) of the arable farmers were artisan. This revealed that majority of the farmers do not rely on farming alone. They also involve in other economic activities like trading, marketing of agricultural products e.t.c.

Years of farming experience

Table 1 revealed that, (46.8%) of the respondents had their years of farming experience between 20-35 years. This followed closely by those with farming experience between 30-50 years (48.6%), 51-60 years of farming experience (4.6%). The mean years of farming experience was 37.30 years. This implies that significant number of respondents had more farming experience. The extensive farming experience will help small scale farmers achieve greater productivity, as well as sustain Agriculture (Ajani *et al* 2012).

Land acquired

From table 1, it was revealed that majority (73.7%) of the arable farmers acquire their land through inheritance, while (26.7%) of the farmers purchase their farmland.

Farm size (hectares)

Data from table 1 shows that the farm size of majority (68.9%) of the farmers ranged between 1.0- 2.0 hectares, while (15.6%) had farm size of between 2.6 – 3.0 hectares and (15.6%) of the farmers ranged between 3.1-4.0 hectares. The mean farm size of the farmers was 2.4hectares, which imply that farming activities were dominated by small – scale farmers.

Source of finance

Table 1 reveals that majority (85.7%) of the farmers fund their farms through personal saving, while (14.3%) of the farmers finance their economic activities through the assistance of the esusu. This implies that majority of the farmers rely own their own capacity to fund their productivity.

Source of input

Results in table 1 reveal that (74.2%) of the farmers depend on the previous production which serves as input for their next production, while (24.8%) of

the farmers purchase their input from the sale agents. From table 1. Majority (78.3%) of the arable crop farmers used family-labour which indicated that they do most of farm operation by themselves while (21.75%) of the farmer hire labour to carry out some farming operation like weeding, planting. This might be as a result of inadequate finance and hired labour

Extension contact

The result in table 2 shows that almost average respondent of farmers had no extension contact (47.5%) while (35.3 %) had between 1 and 5 contact with extension agent within a year on the use of ICTs and other improved farm management practises. However, as low as (17.2 %) had between 6 and above contact with extension agent. Low level of extension contact might be due to the fact that extension agent were not well- equipped to face the challenges ahead because of inadequate training and use of ICTs. This result is in line with the finding of Ogunjimi (2011) that there was low level of extension contact among farmers in south-western Nigeria. Moreover extension agent are expected to visit group of farmers at least forth night (Williams etal 1984) but the contrary was the case

Table 1: Percentage distribution of personal characteristics of respondents.

Variables	frequency	percentage	mean/std
Age (years)			50.5/8.74042
40-50	37	41.0	
51-60	30	32.4	
60 and above	23	25.4	
SEX DISTRIBUTION			1.3778/0.48755
Male	56	62.2	
Female	34	37.8	
MARITAL STATUS			1.66/1.229
Married	66	73.3	
divorced	7	7.8	
separated	6	6.7	
widow	11	12.2	
YEAR OF EDUCATION			5.5333/4.69329
0	24	24.7	
1-6	41	40.9	
7-12	35	34.5	

Source: Field survey, 2016

Table 2: percentage distribution of socio-economic characteristic of respondent

Variable	frequency	percentage	Mean/Std
Minor occupation			0.85129/0.48459
Trading	57	63.3	
Artisan	33	36.7	
Farming experience(years)			37.30/0.75252
≥ 25	6	6.6	
26-50	70	73.3	
50 above	14	20.1	
LAND ACQUIRE			0.7333/0.44469
Purchase	34	26.7	
Inheritance	56	73.7	
FARM SIZE(hectares)			2.4667/0.75252
1-2	62	68.9	
3-4	14	15.6	
4-6	14	15.6	
INCOME			
1,000 – 20,000	43	47.8	
21,000 – 40,000	42	45.0	
41,000-50,000	5	7.2	
SOURCE OF FINANCE			1.000/0.000
Personal saving	70	85.7	
Esusu	20	14.3	
SOURCE OF INPUT			0.9000/0.30168
Previous production	58	74.2	
Sales agents	32	24.8	
SOURCE OF LABOUR			0.6333/0.48459
Self-labour	70	78.3	
Hired-labour	30	21.7	
Extension contact			
No contact	45	47.5	
1-5	30	35.3	
6 above	15	17.2	

Source: Field survey, 2016

Awareness of ICTs

The result of data analysis on the existing ICT facilities in the study area revealed numerous ICTs were available but the respondents were not fully aware of them. Majority of the respondents testified to the existence and awareness of radio, followed by telephone and television.

Table 3: Distribution of the Respondents on their awareness level of ICT Facilities

Awareness	Frequency	Percentage
Not aware	60	66.8
Aware	30	33.4
Mean	2.11	
Std. dev	0.879	

Source: Field survey, 2016

Accessibility to ICTs

The table indicated that (53.3%) had no access to telephone while (33.3%) of the respondents had access to telephone occasionally. Only few respondents (13.3%) had access to telephone always. For radio (27.8%) of the respondents had access to radio, (33.3%) of the respondent had access to radio occasionally while (38.9%) of the respondent do not have access to radio. (46.7%) of the respondents do not have access to television, (40.0%) had access to television occasionally while (13.3%) had access to television always.

It is clear that radio is highly used as source of information among farmers due to the ability to get hold of the listeners attention even without picture. This is in agreement with Shettima, (2001) that radio is also portably, easily operated and can be handled by anybody even uneducated person. Responding to question in the ICTS medium frequency used by the respondents, about 25% of them indicated radio as an ICT facility for obtaining information on input deliveries and went on further to explain that radio were relating cheap, available and understandable means of communication. From the above result, greater number of respondents (53.3%) had no access to telephone for information on input delivery.

Table 4: Percentage Distribution of the Respondents on their access to ICTs

ACCESS	always accessible		Occasionally accessible		Not accessible	
	Frequency	%	Frequency	%	Frequency	%
Telephone	12	13.3	30	33.3	48	53.3
Radio	25	27.8	30	33.3	35	38.9
Television	12	13.3	36	40.0	42	46.7

Source: Field survey, 2016

Usage of ICTs

Data from table 5 revealed that (17.9%) of the respondents uses telephone to access information on input delivery, 18.8% got information through radio on availability of farm inputs and 6.7% uses television to obtain information on input delivery always. This shows that the level of ICTs in input delivery is low and not always use. This collaborate with Helen *et al* (2008), that the availability of media sources does not necessarily mean its usage

Table 5: Percentage Distribution of the Respondents on their level of ICTs usage in input delivery

	Always used		Occasionally used		Not used	
Usage	Frequency	%	Frequency	%	Frequency	%
Telephone	17	17.9	32	35.6	41	45.6
Radio	16	18.8	31	34.4	43	47.8
Television	6	6.7	27	30.0	57	63.3

Source: Field survey, 2016

Types of farming operation

From table 6, majority (75.6%) of the respondents do not use ICTs in input procurement, (61.1%) do not use ICTs in obtaining market information, (35.5%) of the respondent do not use ICTs to acquire information on weather and (38.9%) of the farmers do not use ICTs to obtain agrochemicals information. This shows that the arable farmers do not use ICTs in their farm operation activities to improve their productivity.

Table 6: distribution of respondents according to the type of farm operation farmers are using ICTs for

Farm operation	Very effective		Moderately effective		Low effect		Not effective	
	F	%	F	%	F	%	F	%
Input procurement	8	8.9	8	8.9	6	6.7	68	75.6
Market information	3	3.3	4	4.4	28	31.1	55	61.1
Weather information	10	11.1	20	22.2	28	31.1	32	35.6
Agrochemicals	8	8.9	17	18.9	30	33.3	35	38.9

Source: Field survey, 2016

Information needs of the farmers

Table 7 revealed that majority (81.0%) of the arable farmers needs information on how to improve their planting materials, (72.2%) of the respondents indicated that they need information on marketing of their farm produce, (58.9%) of the farmers need information on processing (64.4%) of the arable farmers need information on disease identification while (52.2%) of the farmers need information harvesting. This finding indicated that majority of the farmers need to be trained on the use of ICTs to access information on improve farm practises

Table 7: distribution of respondent according to their information needs farmers

Information	Frequency	Percentage
Market information	65	72.2
Improve planting materials	73	81.0
Processing information	53	58.9
Disease identification	58	64.4
Harvesting	47	52.2
Mean	1.89	
Std dev	0.8923	

Source: Field survey, 2016

Effectiveness of ICTs

The table revealed that majority (16.2%) (12.2%) of the respondents claimed that radio was the most effective ICT use in dissemination of information on input delivery while (58.9%) and (55.6%) indicated that television and telephone had no effect respectively. This is a clear indication of how Radio is so important in information dissemination. Respondents indicated Radio as the most useful, stating radio as highly portable, available and understandable.

Table 8: distribution of respondents according to the level of effectiveness of ICTs in input delivery in arable production

ICT	Very effective		Effective		Rarely effective		Not effective	
	F	%	F	%	F	%	F	%
Telephone	9	10.0	15	16.2	16	18.2	50	55.6
Radio	11	12.2	23	25.6	21	23.3	35	38.9
Television	4	4.4	10	11.1	23	25.6	53	58.9

Source: Field survey, 2016

Factors that influence the utilization of Icts

Table 9 revealed that inadequate income (42.2%), knowledge of the usage (42.2%) culture and tradition (42.2%) of the farmers had high influence on utilization of ICTs. It also indicated that lack of power supply (39.6%) had high influence on the utilization of ICTs by the farmers. These findings supported the views of Omotayo (2005) that many rural areas of developing countries had no access to the basic telecommunication services that support key ICTs like the telephone and internet. In Nigeria, electricity is a major problem thwarting the use of ICTs. This is also in agreement with Odoemelem and Olojede (2010) who indicated challenges such as lack of electricity, supply and lack of signal prevent farmer's especially rural farmers using Television for sourcing agricultural information. Arokoya (2005) found that the major factors affecting the utilization of ICTs were erratic and unstable power supply, problem connectivity, low level readiness of farmers to embrace the use of ICTs, high costs of telephone services, limited access to computers, lack of communication policy, high level of rural poverty and illiteracy.

Table 9: Factors that influence the utilization of ICTS

Factors	High influence		Moderate influence		Low influence		No influence	
	F	%	F	%	F	%	F	%
Income available to farmers	38	42.2	28	31.1	16	17.8	8	8.9
Knowledge of the usage	38	42.2	20	22.2	10	11.1	22	24.4
Source of power supply	35	39.6	25	27.2	20	25.6	10	7.6
Culture and tradition	38	42.2	20	22.2	10	11.1	22	24.4
Attitude to usage	36	40.0	22	24.4	12	13.3	20	22.2

Source: Field survey, 2016

Constraint to ICTs

Table 10 shows the factors militating against the utilization of ICTs by the arable farmers in the study area. Financial constraint was rated highest 62.7%, low technical knowhow (24.95) and inadequate access to information (13.3%) respectively. Other constraints are inability to operate some ICTs, poor access to ICTs and lack of interest. The results is in line with Torimiro, etal (2007) and Sebusang and Masupe (2003) who pointed out that lack in adequate infrastructural facilities and poverty contributed to the inability of an individual in the less developed economies to access and use ICTs for the purpose of achieving personal and socio-economic development. This is also in agreement with Fasina (2009) who asserted that constraints such as Lack of constant supply of electricity, high cost of ICT, lack of operational knowledge affect the use of ICTs devices as a sources of Agricultural information.

Table 10: Constraints to utilization of Icts

Constraints	Frequency	Percentage	Rank
Financial constraint	60	62.7	1 st
Low technical knowhow	25	24.0	2 nd
Inadequate access to information	15	13.3	3 rd
Mean	0.378		
Std. dev	0.488		

Source: Field survey, 2016

Rank-order of statement of opinion on perception of arable farmers towards usage of ICT

Table 11 shows that the grand mean perception score of the respondents toward use of ICTs is 3.23. Ict intervention has brought more income to me as a farmer was ranked first with a mean of 3.63. The farmers strongly disagree that ICTs has brought more income to them, Icts have made farming more expensive was ranked second with a mean of 3.50, the farmers agreed to this statement.

Other statements were ranked in the following order: “prevent direct access to extension agent” (mean- 3.45), Icts provide information that has led to the improvement of agriculture (mean- 3.20), Inadequate infrastructural facilities makes it difficult to use (mean- 3.17), ICTs have been of help in regards to assessing input deliveries like fertilizers, seeds (mean- 3.13), Farming has been made easier and better through the intervention of ICTs (mean-3.10), Ict provide enough skill for farming (mean- 3.10), Modern techniques have been applied through the help of ICT (mean- 3.00), ICT technical know is difficult (mean- 2.89)

Table 11: Rank-order of statement of opinion on perception of arable farmers towards usage of ICT

Perception	Mean	Rank
Ict intervention has brought more income to me as a farmer	3.63	1 st
Icts have made farming more expensive	3.50	2 nd
Prevent direct access to extension agent	3.45	3 rd
Icts provide information that has led to the improvement of agriculture	3.20	4 th
Inadequate infrastructural facilities makes it difficult to use ICTs	3.17	5 th
ICTs have been of help in regards to assessing input deliveries like fertilizers, seeds	3.13	6 th
Farming has been made easier and better through the intervention of ICTs	3.10	7 th
Ict provide enough skill for farming	3.10	8 th
Modern techniques have been applied through the help of ICT	3.00	9 th
ICT technical know is difficult	2.89	10 th
Grand mean	3.23	

Source: Field survey, 2016

Testing of hypotheses

The results of correlation analysis in Table 12 revealed that there were positive and significant relationship between arable farmers level of ICTs usage and schooling ($p = 0.05$, $r = 0.378$) extension visit ($p = 0.05$, $r = 0.275$), income ($p = 0.05$, $r = 0.423$). These results implied that the higher the level of schooling, extension contact and income, the more they are favourably disposed to use of ICTs. On the other hand, there was negative and significant correlation between age of arable farmers ($p = 0.05$, $r = -0.262$) and level of ICTs usage. This indicated that the higher age of arable farmers, the lower the usage of ICTs.

Table 12: Correlation analysis between respondents personal socio-economic characteristics and effective usage

Variables	Correlation coefficient (r)	Coefficient of determinant (r^2)
Age	-0.262*	0.068
Schooling	0.378**	0.143
Extension contact	0.275**	0.076
Income	0.423**	0.179

$p \leq 0.05$, **= positively significant, *= negatively significant

Source: Field survey, 2016

The results of correlation analysis in Table 13 revealed that there is no significant difference between accessibility and effective usage of ICTs.

Table 13: Correlation analysis between accessibility and effective usage of ICTs

variable	Correlation coefficient (r)	Coefficient of determinant (r ²)
Accessibility	0.092*	0.0125

$p \leq 0.05$; * = negatively significant

Source: Field survey, 2016

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 SUMMARY

The study assessed the effectiveness of Information and Communication Technology in dissemination of agricultural information on input delivery among arable crop farmers in Ekiti State, Nigeria. Generally, 3 out of 14 of the selected ICT tools were categorized into high level of awareness. These are radio, television and Mobile telephone (GSM). Meanwhile, radio and telephone were ICT tools categorized into high level of access. These ICT tools were also rated as moderately effective to arable crop production activities in the area of input delivery, fertilizer application and marketing of arable crop produce. Also, there were significant differences in the mean scores in access and usage of various selected ICT tools.

5.2 CONCLUSION

Based on the findings of this research work, it can be concluded that radio and telephone followed by television were the most accessed and utilized ICTs among the farmers. However, the level of ICTs application to farming operations of the farmers was still low, hence intensive effort should be made in creating and promoting favourable environment that will speed up the full utilization of the potentials of ICTs in agricultural operations in the area. This

is predicated on the fact that ICTs are essential for sourcing and disseminating information on input delivery for agricultural production. Thus, improved productivity by farmers can only be achieved through communication of the results of research findings to the largest numbers of people in the shortest possible time. Many of the arable crop farmers do not have access to information and communication technologies. However, the use of ICTs was limited by low technical, know-how, inadequate access to information, financial and institutional constraints. Overcoming these challenges would ensure increased use of ICTs for agricultural activities.

5.3 RECOMMENDATION

Based on the findings of this study, it was recommended that:

- Agricultural extension services in the Ekiti state, should incorporate or strengthen the use of other ICTs especially the contemporary ICTs such as mobile phones for information dissemination to the farmers.
- ICT training programmes should be organised/ established for training farmers on opportunities that abound in the use of ICT facilities in their farming operations. This can be achieved by incorporating ICT training in extension service packages.

- Improvement in rural infrastructure particularly electricity supply is very essential in the study area.
- Radio farm programmes should be aimed at the time when the farmers (primary audience) will be able to listen to the programme preferably very late in the evening.
- Governmental and non-governmental organization should encouraged farmers to access and utilize ICTs by supporting them with resources both financially and materially.
- Government could provide infrastructural facilities such as constant electricity, health facilities and modern farm facilities to enable farmers utilize ICTs, ensure periodic training for both farmers and extension agents on the operation of ICTs, subsidize ICTs facilities, and constant public enlightenment programmes to intimate male and female farmers of the need to employ ICTs in their agricultural activities.

This can be actualised by providing them with credit grant or the equipment by the government. The current effort of the federal government of Nigeria to distribute 6 million mobile phones to farmers is

a good example and will enhance the access and utilization of ICTs among farmers for agriculture production.

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APPENDIX

QUESTIONNAIRE

FEDERAL UNIVERSITY OYE-EKITI, EKITI STATE

DEPARTMENT OF AGRICULTURAL EXTENSION AND RURAL DEVELOPMENT

RESEARCH TOPIC: EFFECTIVENESS OF INFORMATION AND COMMUNICATION TECHNOLOGY IN DISSEMINATION OF AGRICULTURAL INFORMATION ON INPUT DELIVERY AMONG ARABLE FARMERS IN EKITI STATE.

Dear respondent,

This questionnaire is strictly for academic purposes and as such it will be extremely appreciated if you give relevant information as it will be treated confidentially.

INSTRUCTION: please tick () or fill the spaces as it applies to you.

SECTION A (Socio-economic characteristics)

1. What is your age? (a) 20-40() (b) 41-60 () (c) 61-80() (d) 81-100()
2. What is your gender? (a) male (b) female
3. Marital status (a) married () (b) single () (C) divorced () (e)separated ()
4. Family size?
 - I. No of wives.....
 - II. No of children.....
 - III. No of dependent.....
 - Total =
5. Highest level of education obtained? (a) no formal education () (b) primary education () (c) secondary education () (d) tertiary education () (e) adult education ()
6. Year of schooling-----
7. What type of arable crop do you produce? (a) Yam () (b) maize () (c) rice () (d) vegetable () (e) others, specify.....

8. How long have you been involved in arable crop production?
.....
9. How do you acquire land for arable crop production (a) rent () (b) purchase () (c) inheritance () (d) leasehold () (e) others, specify.....
10. What is your farm size in (hectares).....
11. What are your sources of finance (a) personal saving () (b) loan () (c) cooperative/esusu () (d) community bank () (e) commercial bank () (f) sale agents () (g) input suppliers () (g) other, specify.....
12. Apart from farming, what are your other occupations (a) trading () (b) teaching () (c) civil service () (d) artisan () (e) others, specify.....
13. What are your sources of labour (a) self-labour () (b) family labour () (c) hired labour () (d) others, specify.....
14. Estimate your cost of production/annum-----
--
15. What is your income/annum?.....
16. What are your sources of information? (a) other farmers () (b) family () ADP extension agent () (b) television () (c) radio () (d) telephone () (e) research officer ()
17. How often are you visited by the village extension agent on your farm (a) weekly () (b) monthly () (c) yearly () (d) forth night ()
18. How many times per/ year that you are visited by extension agent-----

19. What is the level of effectiveness of the information obtained from the extension worker? (a) very effective () (b) effective () (c) fairly effective () (d) rarely effective () (e) not effective ()
20. How do you source for you input for your crop production (a) Sales agents () (b) inputs suppliers () (c) Government () (d) previous production () (e) others-----

SECTION B (awareness and usage of ICTs)

21. Are you aware of ICT usage in Agriculture Yes/No
22. Is ICT accessible to you whenever you want to have information on input delivery

ICTs	Always accessible	Occasionally accessible	Not accessible
Telephone (fixed and mobile)			
computer system			
Radio			
Television			
The Web			
Search Engines			
Cameras			
Videos,			
E-mail			
Computer Scanner			
CD-ROM			
DVD			
Satellite			
Web Publishing			
Fax			
Printer			

25 How frequent do you have access to ICTs in input delivery (a) Daily () (b) monthly () (c) weekly () (d) yearly ()

26 Do you use any of these ICTs and what are the level of usage in input delivery

ICTs	Always used	Occasionally used	Not used
Telephone (fixed and mobile)			
computer system			
Radio			
Television			
The Web			
Search Engines			
Cameras			
Videos,			
E-mail			

Computer Scanner			
CD-ROM			
DVD			
Satellite			
Web Publishing			
Fax			
Printer			

27 What is/are the source(s) of the ICT you are using(a) personal purchase () (b)Government () (c) NGO() (d) other specify-----

28 What farming operation are you using ICT for

Farming operation	Very effective	Moderately effective	Low effect	Not effective
Input procurement				
Market information				
Whether monitoring				
Agrochemicals usage				
Others, specify				

29 Has ICTs helped you in getting inputs for farming
Yes/No

30 If yes, through what means

- i. Radio ()
- ii. Television ()
- iii. Newspaper ()
- iv. Internet ()
- v. Others, specify.....

31 What kind of information do you need to improve your arable crop production? (a) market information () (b) improve planting materials () (c) processing information () (d) fertilizer application () (e) harvesting () (f) weather forecast () (g) agrochemicals () (h) diseases identification ()

32 Have you attended any training on ICT

YES/NO

33 If YES, how frequent? (a) weekly () (b) monthly () (c) forth-night () (d) yearly ()

34 Who organised it (a) government () (b) extension worker () (c) community leaders () (d) other, specify.....

35 To what level is any these factors influence the utilization of ICTs by the farmers

Factors influencing utilization of ICT	High influence	Moderate influence	Low influence	No influence
Income available to farmers				
Knowledge of the usage				
Sources Power supply				
Culture and tradition				
Attitude to the usage				
Others, specify				

36 Indicate the level of effectiveness of the following ICTs input delivery in arable crop production

ICT	Very effective	Effective	Rarely effective	Not effective
Telephone (fixed and mobile)				

computer system				
Radio				
Television				
The Web				
Search Engines				
Cameras				
Videos,				
E-mail				
Computer Scanner				
CD-ROM				
DVD				
Satellite				
Web Publishing				
Fax				
Printer				

37 What are the constraints to utilization of ICTs? (a) Financial constraints () (b) low technical knowhow () (c) inadequate access to information () (d) privacy () (e) other, specify.....

38 Are you aware of e-wallet usage in inputs distribution yes/No

39 If yes, have you registered with Ministry of agriculture in your state? Yes/ No

40 If No why-----

41 If yes have you collected fertilizers and seeds through this source for your arable crop production?

42 If yes, how many bag(s) of fertilizers----- kg and seeds-----kg

43 If no why? (a)The processes of collecting the inputs is difficult (b) counterpart fund is high() (c)Highjack by influential people() Other specify

44 Have ICTs been able to influence your market for arable produce
Yes/No

45 If YES, which of the following ways has it helped you,

- i. Quick sales of products ()
- ii. Timely information of market price ()
- iii. Easy access to marketers ()
- iv. Others, specify.....

SECTION C:

46 Perception towards use of ICT's (Information Communication Technology)

Key; very effective, 4- effective, 1-rarely effective, 0- not effective.

Perception statements	Strongly agree	Agree	Decided	Undecided	never
1. ICTs provide enough skills for farming					
2. ICTs have made farming more expensive					
3. ICTs provides information that has led to the improvement of agriculture					
4. ICT technical know is difficult to acquire					
5. Farming has been made easier and better through the intervention of ICTs					
6. ICTs intervention has brought more income to me as a farmer					

7. Modern techniques have been applied through the help of ICT					
8. ICTs have been of help in regards to assessing input deliveries like fertilizers, seeds etc.					
9. Inadequate infrastructural facilities make in difficult to use					
10. It prevent direct access to extension agent					