ASSESSMENT OF PERCEPTION OF USE OF INFORMATION COMMUNICATION TECHNOLOGY AMONG AGRICULTURAL EXTENSION AGENTS IN ZAMFARA STATE, NIGERIA

BY

Nasir Abdulmumin KURA

DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION
FACULTY OF EDUCATION,
AHMADU BELLO UNIVERSITY,
ZARIA

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Nasir Abdulmumin KURA
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A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY ZARIA, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER DEGREE IN

AGRICULTURAL EDUCATION

DEPARTMENT OF VOCATIONAL ANDTECHNICAL EDUCATION,
FACULTY OF EDUCATION,
AHMADU BELLO UNIVERSITY,
ZARIA

SEPTEMBER, 2018

DECLARATION

I declare that the work in this dissertation titled Assessment of the perception ofuse of ICT among agricultural extension agents in Zamfara State, Nigeria, has been carried out by me in the Department of Vocational andTechnical Education, Ahmadu Bello University, Zaria. The information derived from the literature has been duly acknowledged in the text anda list of references provided. No part of this dissertation was previously presented for another degree or diploma at this or any other institution.

_____ _____

NasirAbdulmumini Kura Date

CERTIFICATION

This dissertation titled "ASSESSMENT OF THE PERCEPTION OF USE OF INFORMATION COMMUNICATION TECHNOLOGIES AMONG AGRICULTURAL EXTENSION AGENTS IN ZAMFARA STATE, NIGERIA"meets the regulation governing the award of master of sciencedegree in agricultural education ofAhmadu Bello University and is approved for its contribution to knowledge and literary presentation.

_____	_____
Prof. B.I Okeh Chairman, Supervisory Committee	Date
_____	_____
Dr. C. Uguru Member,Supervisory Committee	Date
_____	_____
Dr. S. Ibrahim Head,Department of Vocational andTechnical Education	Date
_____	_____
Prof. S. Z. Abubakar Dean, School of Post Graduate Studies	Date

DEDICATION

This research work is dedicated to the family of Late AlhajiAbdulRahmanMaijimina.

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LISTS OF ABBREVIATIONS

ADP: Agricultural Development Projects

AISI: African Information Society

AKIS: Agricultural Knowledge and Information System

APMEU: Agricultural Project Monitoring and Evaluation Unit

ARPANET: Advanced Research Project Agency Network

CD-ROM: Compact Disc Read-Only Memory

CGIAR: Consultative Group for International Agricultural Research

CTA: Technical Center for Agricultural and Rural Cooperation ACP-EU

FAO: Food and Agricultural Organization

FM: Frequency Modulation

FSC: Farmers Service Center

GSM: Global System for Mobile Communication

MIS: Management Information System

NAQAS: Nigeria Question Answer Service

NARES: National Agricultural Research and Extension System

ZADP: Zamfara Agricultural Development Project

OPERATIONAL DEFINITION OF TERMS

1. **Agricultural extension:** Is an informaleducational service which is designed to disseminateagricultural knowledge and information to farmers to raise their levels of production and standard of living.
2. **Agricultural extension agents**: These are individuals employed by Zamfara Agricultural Development Project and charged with the responsibilities of disseminating agricultural information and knowledge as well as improved farming practices to farmers in order to improve their productivity and standard of living.
3. **Information Communication Technology:** These are technologies used by agricultural extension agents that facilitate communication, processing and transmission of information to farmers such as Radio, Television, Internet andTelephones.
4. **Socio-economic factors:** Theseare socio and economic variables that influence anextension agent use occupational devices and such variables are family size, income level, level of educational attainments, ageandworking experience.

ABSTRACT

The research study was carried out to assess the perception of the use of Information Communication Technology (ICT) among agricultural extensions agents in Zamfara State. In order to achieve the broad objectives of the study, four specific objectives were raised which included determination of the influence of the level of income and educational attainment of extension agents on the use of ICT in Zamfara State, Nigeria. Four research questions andtwo null hypotheses were formulated for the study. The sample of the study comprised of 340 extension agents drawn from a population of 475 extension agents working in Zamfara State Agricultural Development Project (ZADP). Multi-stage sampling procedure was used to select the sample from the population. A structured questionnaire was used as instrument for data collection. Data were presented in tables and analyzed using percentage, arithmetic mean and standard deviation to answer the research questions. The two null hypotheses were tested using regression analysis at 0.05 level of significance. The result of the tested null hypotheses indicated significant influence of socio-economic factors such as annual income, education, working experience and household size on the use of ICT in ZamfaraState. Findings of the study revealed that level of use of ICT tools among extension agents was very low due to non-availability of these devices. The researcher recommended that concerned stakeholders such as government and other non-governmental organizations should make efforts to address those socio-economic factors such as annual income, education, household size and working experience which influence the use of ICT among extension agents in Zamfara State, Nigeria.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Effective communication of agricultural information to farmers is crucial in achieving optimum efficiency in agricultural extension administration and practice in Nigeria. Agricultural extension in this information age has been recognized as an essential medium of disseminating information and advice to farmers and this can be achieved throughthe use of ICT. In Nigeria today, the concept of ICT has become a global concern and the increasing application of the technology in every segment of our national life, especially through the mobile phones, television, the internet, e-wallet, video, cameras, computers, mobile cinema, cassette recorders and overhead projectors.

Agricultural extension is an informal educational service which brings information andnew technologies to farming communities to enable them improve their production, income and standards of living. Throughout the world, ICT has become increasingly integrated into dissemination of information to farmers. ICT are used to connect and enable learning and also connect communities of farmers and researchers in agriculture. In recent years, a number of Sub-saharan African countries experienced slow agricultural development. The decline in the agricultural development could be attributed to a number of constraints which include inappropriate and inconsistent agricultural policies, inadequate information provision, low level of adoption of improved agricultural technologies and institutional frameworks (KiplangandWallance, 2003).

Yakubu, AbubakarandAtala (2013), report that agricultural development in Africa and Nigeria in particular, has been hampered by low level of agricultural information exchange. Low ExternalInput Sustainable Agriculture (LEISA) now known as Farming

Matters (2005) emphasize that the underlyingis related to the information and knowledge. Access to information is one of the most valuable resources in agricultural development. Recently the demand for agricultural information is of great importance than ever before, thereby making information a prominent factor in agricultural development.

Socio-economic factorsin accordance with this study are socio-economic variables that influence an agricultural extension agents' use of occupational devices in the discharge of his/her assignment.Such variables that are important include level of income, working experience, family size, age and level of educational attainment. Those with higher socio-economic status or variables tend to thrive and many aim to improve their socio-economic variables or factors in order to improve their life chances.

AikensandBarbarin (2010) view socio-economic factors as the economic and sociological combined total measure of a person's work experience and of an individual's or family's economic and social position in relation to others, based on income, education, occupation and other factors. Milner andPlourde (2006) posit that socio-economic factors such as level of income, education and occupation together best represent socio-economic variables that influence the abilities of an individual or individuals to use certain occupational devices.

ICTsare technologies used by agricultural extension agents to facilitate communication, processing and transmission of relevant agricultural information and technologies to farmers. Such technologies include television, radio,mobile phones, as well as the internet facilities. Other technologies include the use of mobile cinema, radio cassette recorders, overhead projectors, and videos.

Adebayo andAdesope (2007) define ICT as the term used to access, retrieve, store, organize, manipulate, produce, present, and exchange information by electronic and other

automated means. Similarly, Michael andVancrowder (2001) described ICTs as a range of electronic technologies which when converged in new configuration are flexible, adaptable, enabling, and capable of transforming organizations and redefining social relation. ICTs therefore, are an expanding assembly of technologies that can be used to collect, store and share information between people using multiple devices and multiple media.

Agricultural extension service depends largely on information exchange between and among farmers and a broad range of other actors, namely the extension agents or workers. Frontline agricultural extension workers, who are the direct link between farmers and other actors in the agricultural knowledge and information system are well positionedto make use of ICTs to access expert knowledge and information that could be beneficial to farmers.

Arokoyo (2005) identifies some potential applications of ICT in agricultural extension to include;

i. Capacity to reach large audience example, the use of radio, television, and the internet.
ii. Can be effectively used for training and demonstrations, example, television, video, compact disk (CD)anddigital versatile disk (DVD).
iii. Can be used to make extension system and structures more efficient through better management of information and scarce resources. Example the use of data bases for management information system (MIS) and networking software.
iv. For the search and packaging of information on demandand for exploring of alternative productive option and technologies

v. ICT may be used for normal weather forecast and as a warning system for diseases/pests outbreaks and other disasters before they occur and also for the provision of timely and sensitive market information. For example with the use of radio, television and short message service(SMS).

vi. ICTs are useful for networking among and between the key stakeholders in the Research-Extension-Farmers-Inputs-Linkage System(REFILS)example, the use of television, video and SMS.

vii. Finally, ICTs can also be effectively used for community mobilization, learning and action. Example, Radio, TV, public address system and the web.

MeeraandDexit (2004) note that ICTs can bring new information services to rural areas where farmers (end users) will have much greater control, than ever before over current information channels. Access to such new information source is a crucial requirement for the sustainable development of the farming systems. Meera,JhamtaniandRao(2004) maintain that, ICT can be of immense help to extension workers to gather, store, retrieve and disseminate broad range of information needed by farmers, thus transforming them from extension workers into knowledge workers(KW) The emergence of such knowledge workers will result in the realization of the much talked about bottom-up, demand derive, technology generation assessment, refinement and transfers.

1.2 Statement of the Problem

The agricultural sector of Nigeria and ofZamfara State in particular is a strong springboard for development if it is given adequate attention. Moreso,ICT has been identified as a veritable channel through which development in agriculture of Zamfara

State and Nigeria in general could be realized particularly in information dissemination and literacy drive of extension agents.

Various reports by the ZADP over the years at the National Agricultural Extension Planning and Review (NAEPR) meetings held at the National Agricultural Extension and Research Liaison Services (NAERLS) show lowextension agent andfarm family ratio of 1:1000. Furthermore, poor mobility of extension staff due to dwindling fund features regularly in the annual reports.Moreover, poor salary, non-payment of allowances,delayed promotion of the extension agents featured prominently in the annual reports. The invasion of the rural communities in Zamfara State by armed bandits, kidnappers and cattle rustlers had worsened the situations. These situations discourages regular visit of extension agents to farmers in the State. Rural farmers who should be given adequate attention and support in terms of provision of current information on relevant agricultural technologies and practices by the extension agents are not adequately assisted and informed, thus, constituting an uphill task in adopting modern technologies. Even when informed, they are beset with confusing and late information. Hence, farmers in Zamfara State are poorly reached by extension agents and thus, the expected high performance level of farmers has not been realized.However, the use of ICT by the extension agents will greatly enhance the dissemination of agricultural information to farmers through the use of radio, television and other ICT tools in the state. ICTs have many and various benefits to the extension agents in particular and transformation of agricultural extension. In view of the above therefore, this study attempted to analyze the perception of the use ofICTs among agriculturalextension agents in agricultural information delivery system in Zamfara State, Nigeria.

1.3 Objectives of the Study

The main objective of the study was to analyse the perception ofthe use of ICT by Agricultural Extension Agents in Zamfara State, Nigeria.

The specific objectives are to:

1. ascertain ICT devices available for use by agriculturalextension agents in Zamfara State, Nigeria;
2. determine the level of perception ofthe use of ICT among agricultural extension agents in Zamfara State, Nigeria;and
3. establish the extent to which socio-economic characteristics of agricultural extension agents influence the use of ICT in Zamfara State, Nigeria.

1.4 Research Questions

The following research questions were answered:

1. What are the ICT devices available for use by agricultural extension agents in Zamfara State, Nigeria?
2. What is the perception of the level of Use of the ICT devices among agricultural extension Agents in Zamfara State, Nigeria?
3. What is the extent to which socio-economic characteristics of agricultural extension agents influence the use of ICT in Zamfara State, Nigeria?

1.5 Research Hypotheses

The following null-hypotheses were tested at 0.05 level of significance:

1. Socio-economic characteristics have no significant influenceon the level of use of ICT byagriculturalextension agentsin Zamfara State, Nigeria.

2. There is no significant influence between ownership of ICT devices andtheir level of use amongagricultural extension agents.

1.6 Significance of the study

At the end of this research study, it is hoped that, the study wouldbenefit farmers, Zamfara state government, Policy makers in agriculture and Researchers in the field of agricultural extension

The rural farmers in Zamfarastate would benefit from the result of this study as the use of ICT enhanced the volume of proven technologies available to assist farmers increase their farm productivity. Improved farming techniques are expected to be brought to their door-steps through the use of ICT devices by extension agents.

The findings of this study would be of beneficial to policy makers in agricultural extension to put more effort towards making the ICT more available, accessible and affordable to the extension workers in Zamfara state.

Through the findings of this study, the government would be sensitized on the problem that bedeviled the use of ICT by extension agents so that they can be effectively addressed by government for better service delivery to the rural farmers.

The findings would also serve as a baseline and reference material for further research in the study area or similar area so as to fill the gaps this study could not identify. The study will also serve as a reference material for future researchers.

1.7 Basic Assumptions of the Study

For the purpose of this study, the following basic assumptions were made:

1. Socio-economic characteristics of the agricultural extension agents in Zamfarastate influence their use of ICT devices.

2. Agricultural extension agents in Zamfarastate have limited access and awareness to the use of ICT in extension delivery due to shortage of ICT devices in extension delivery in the state.
3. The level ofuse of ICT devices among agricultural extension agents is significantly influenced by their availability in the study area.

1.8 Delimitation of the Study

The study was delimited to the assessment of perception of use of ICT among agricultural extension agents in Zamfara State, Nigeria. The socio-economic factors delimited to the study were; the level of income of the extension agents, their level of educational attainments, household size, working experience and the age of the extension agents because they are the main concern of the research study. The research study was further delimited to the availability and level of use of ICT devices in the area under study.The study was delimited to agricultural extension agents in the fourteen (14) LGAs of Zamfara State working with ZADP.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter reviewed related literature under the following sub-headings:

2.1 Theoretical Framework

2.2 The Conceptual Framework

2.3 The Concept of Socio-economic Factors

2.3.1 Income as a Socio-economic Factor

2.3.2 Education as a Socio-economic Factor

2.3.3 Occupation as a Socio-economic Factor.

2.4 The Concept of ICT

2.5 ICT Devices used in Agricultural ExtensionServices Delivery

2.6 The Potential Impact of Application of ICT in Agricultural Extension Delivery

2.7 Factors Influencing the adoption and use of the ICT in extension

2.8 The Agricultural Development Projects (ADPs) in Nigeria

2.9 Current Extension Delivery and Management and Major Actors in Nigeria

2.10 Major Constraints to ICT use in Extension Delivery in Zamfara State, Nigeria

2.11 Review of Empirical Studies

2.12 Summary of Review of Related Literature

2.1 Theoretical Framework

Simonson and Thompson (1997) state that, a theory is a well-substantiated explanation of an aspect of the natural world that can incorporate laws, hypotheses and facts.Theories serve two purposes namely: provide direction for future research and provide a direction to the practice of a profession. Theories are not rigid, but continually progresses as new research findings are introduced to a given body of knowledge (Simonson and Thompson, 1997).

A research study, like this, requires a theoretical basis. Incidentally, it is to be noted that extension agents are agents of change and ICT is a tool of change. The study was premised on the theory of social change. Social change theory focuses on how individuals influences and are influenced by the society which guides investigations into how the rules of the society are re-created through interaction with one another. Rogers (1995) defines social change as the process through which alteration occurs in the structure and function of the social system. This shows that innovations and communication form the major parts of the social structure and the relationships in the society..

Ekong (2005) views social change as a modification in human attitudes and the developmental pattern as a result of education and alteration in social condition as a result of change in policies of a social organization, including consequences and manifestations of such changes.Ekong (2005) further observesthat social change in a social system can be referred to as a major change in behavior patterns, norms, and values over a period of time. Influence occurs when an individual through feelings and actions is influenced or affected by other people. Influence takes many forms and can be seen in conformity with socialization, peer influence, obedience, leadership, persuasion, sales and

marketing.Igbokwe (2005) explains that development is a type of social change in which new ideas are introduced into a social system in order to produce higher per-capita incomes and levels of living through more modern production methods and improved social organization.

Deutsch and Gerard (2003) describe two psychological needs that lead human beings to conform to the expectations of others. This includes our need to be right that is informational social influence and our need to be liked that is normative social influence.

1. Informational influence (social proof):Is an influence to accept information from others as evidence about reality; this occurs when people are uncertain either because stimuli are intrinsically ambiguous or there is social disagreement.
2. Normative influence: This is an influence to conform to positive expectations of others which leads to public compliance while informational influence leads to private acceptance.

With the theory of social change members of the society are taught the benefit of conforming to or accepting standard behaviors.This study is geared towards transforming a conventional person unto a person of extension interaction of modern system through communication in which a large number of audience could be reached at a time. The use of radio, television, telephones and other internet facilities is a shift from traditional extension delivery to a modern way which is being advocated in the theory of social change.

Another theory for this study is the modernization theory of developmentwhich was popular in the 1950s and it was prompted after the Second World War by three major factors.

First, the rise of the United State as a super power where World War II weakened other western nations such as Great Britain, France and Germany. The United State emerged from the war strengthened and became a world leader with implementation of the Marshall Plan to reconstruct war-torn Western Europe through modern technologies. Second, with the spread of a united world communist movement the former Soviet Union extended its influence on EasternEurope, China and Korea.Third, the disintegration of European colonial empires in Asia, Africa and Latin America giving birth to new nation-states as third world. These situations prompted the new nation-states to seek a model of development to promote their economy and to enhance their political independence. This gave birth to modernization.

According to the modernization theory,modern societies are more productive, children are better educated and the needy receive more welfare. Politically, the features of modern societies were:

1. Differentiation of political structures
2. Secularization of political culture with the ethos of equality
3. Enhances the capacity of a society's political system

The major assumptions of the modernization theory of development are;

1. Modernization is a phased process for example Rostow has five phases
2. Modernization is a homogenizing process
3. Modernization is Europeanization or Americanization process
4. Modernization is an irreversible process, once started modernization cannot be stopped
5. Modernization is a progressive process which in the long run is not only inevitable but desirable
6. Modernization is a lengthy process. It is an evolutionary change not a revolutionary.

Modernization is a systematic process as well as transformative process.In order for a society to move into modernity its traditional structures and values must be totally replaced by a set of modern values. Modernization theory has the following strengths in that it identifies the basis of the research focus and it provides analytical framework between the third world nations which are traditional and western countries which are modern.

Critics of the theory are however of the view that development is not necessarily unidirectional, modernization perspective only shows one possible model of development and that modernization theory regards the need to eliminate traditional values. Traditional and modern values are not necessarily always mutually exclusive. In this study, the use of ICT in promoting technology dissemination and adoption is expected to bring about changes in the lives of rural farmers. The tenant to which this study adopted this theory was to promote modernity within the rural communities.

2.2 Conceptual Framework

A number of related literatures were reviewed to reveal socio-economic factors influencing the use of ICT in agricultural extension. Literature review on socio-economic factors influencing the use of ICT in agricultural extension among extension agents revealed that uses of ICT among extension agents are influenced by the overall economic and social issues in Zamfara State. Based on the literature reviewed and the researchers observation in the study area, potential socio-economic determinants which were assumed very important in influencing the use of ICT in agricultural extension among extension agents were identified as economic such as on-farm income, off-farm income, non-farm income, household size and access to credit services. Social factors were identified to be age, sex, educational level, and working experience.

Figure 1 depicts that the use of ICT among extension agents depends on the socio-economic factors such as age, level of education, household size, experience and annual income. The resultant effect is the expected outcome, that is, a situation where the number of farmers reached with relevant agricultural information is increased. This scenario is studied using Zamfara State as a case study.

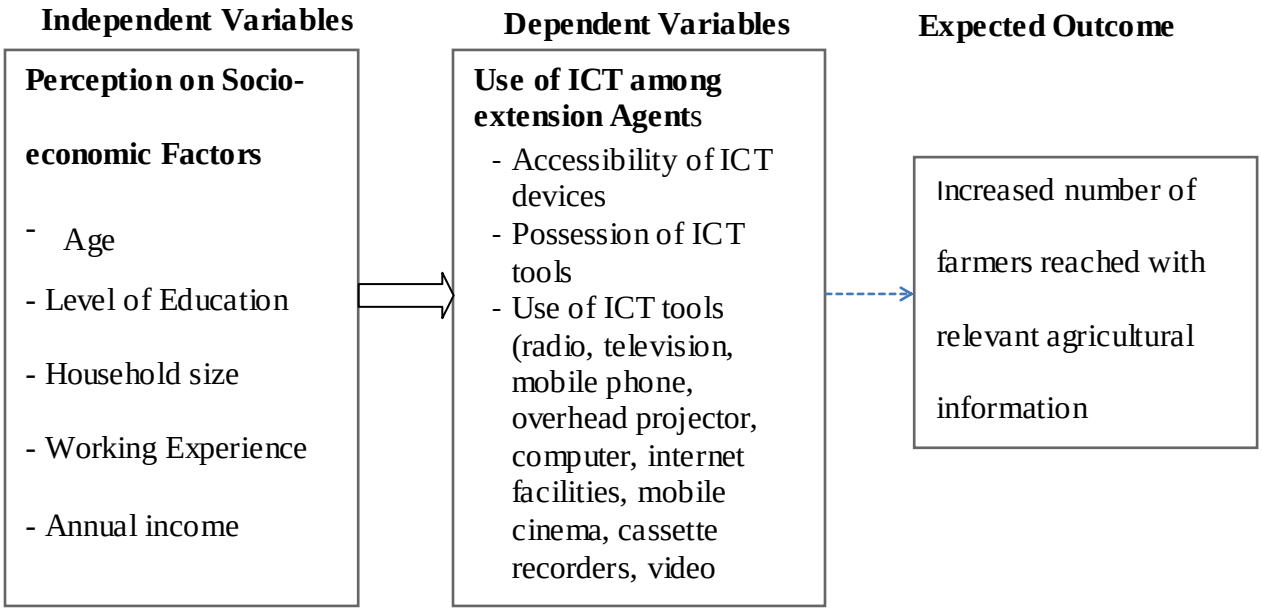


Fig 1: Model on the influence of socio-economic factors on the use of ICT among extension agents

2.3 Socio-economic Factors

Socio-economic factors according to Oakes and Rossi (2003) reflect one's access to collectively desired resources like material goods, money, power, friendship networks, healthcare, leisure time or educational opportunities. They further maintained that it is access to such resources that enables individuals and/or group to thrive in the social world. Those with high socio-economic variables tend to thrive and many aim to improve their socio-economic status or that of their children in order to improve their life chances.

Socio-economic factors refer to an economic and sociologically combined total measure of a person's work experience and of an individual's or family's economic and social position in relation to others, based on income, education and occupation (AikensandBarbarin, 2010). Research experts such as Milner andPlourde, (2006) agree that socio-economic factors such as level of one's income, education and occupation best represent socio-economic variables that influence the abilities of an individual or groups of individuals to use certain occupational device such as ICT tools/devices in agricultural extension delivery system.

Additionally, Kraus andKeltner (2008) explain that, socio-economic factors are the social and economic experiences and realities that help mold one's personality, attitudes and lifestyle. When analyzing family's socio-economic status, the household income, earners' education and occupation are examined as well as combined income, versus an individual when their own attributes are assessed.

2.3.1Age as a Socio-economic Factor

The age concept has recently emerged in various fields among others, namely,gerontological, psychological, futurological, demographic, legal, political and cultural contexts as an interest of research. Diversity studies have included age among race, gender, creed, ethnicity, background, education, function, and personality differences (Williamsand O'Reilly, 1998). At the sametime, while a vast amount of organizational studies have covered almost every angle of the leadership theme (Åhman, 2003), the concept of age has largely been ignored. The almost untouched area of the conceptualization of age, and as a consequence of it, the discursive perception of a leader as well as his/her capabilities needs to be explored and unmasked further. This is particularly important due to the topical importance of age understanding in emergence of

the huge demographic changes. At the same time lifelong training/learning provides individuals with adequate knowledge throughout their lives, and the march of powerful new technologies will probably have greater impact on human life and its expectancy, and also to the aging process which can be slowed down or even reversed (Featherstone andHepworht, 1998), than we can even imagine. Bio-technology is marching to such extreme fluid stages where "leakiest" distinction or boundaries will be those between the human and animal, the human and the machine, and the physical and the non-physical...."It is essential to understand age also due to its human and organizational significance. Age is a human attribute that has long been taken for granted. However, we know very little about the age beneath the skin and beyond the body. Older age and the age concept need to be explored fromdiscoursesof age that have been constructed over social practices and time since they are ascribed to the leader's identity, especially when using it in relation to the capability perception. Biases, that obviously exist,should be first recognized and then made visible so that those biases could be overcome. Learning to know age would be a leap to a more neutral, more justified, more complete and more whole perception of age in determining leaders' capabilities in the post-modern organization and preparing societies to encounter inevitable changes more efficiently. Two dominant discourses serve as a bridge to new reflection of possible or inevitable developments in understanding age.

a) Firstly frombio-medical models (Powell andLongino, 2002) in understanding bodily change through later life and

b) Secondly frompower-based models.

2.3.2 Household Size

Literature is full of evidence that large households are associated withpoverty (Gang, Senand Yun, 2004). The absence of well-developed social security system and low savings in developing countries (especially those in Africa) tends to increase fertility rates, particularly among the poor, in order for the parents to have some economic support from children when parents reach old age. This isone of the rationales for parents to increase the number of children so that they will have highprobability of getting support when they are old. Also, as Schultz (1981) has indicated, high infantmortality rates among the poor tends to provoke excess replacement births or births to insure against high infant and child mortality, which will increase household size. There are some cultural issues and thinking on household size and population that are peculiar to Nigerians. For example, apart from the tradition of polygamy, which is more prevalent in the Moslem north but dying in other parts of the country, there is also the belief that children are "gifts from God"in a male-dominated society.

In addition, Nigeria is still conceived as a "high birth, high death" society where many people think that they need to have as many children as possible since they do not know which will survive.Following micro-economic arguments, in Nigeria, children are considered as an essential part of the household's work forceto generate household income, and as insurance against old age. However, a high number of children and their participation in household production are likely to impede investment in their human capital (i.e. education and health), maintaining the low-income status of the household, and thereby creating or perpetuating a poverty-fertility trap. Indeed, by "acquiring" children the share of household resources available for each member decreases. Moreover, newly born children may decrease the productivity of the mother either by

takingmore resources (such as food) from her or hampering her work prospects. Thus, the perceived benefits and costs of children, and hence the fertility behavior, depend on economic forces, social organizations, and cultural patterns. In this sense, poverty-household size relationship is contingent upon social and institutional characteristics, such as education, family planning and health services. However, the impact of household size on poverty may essentially be an empirical question, even with micro data as economic entities differ in their peculiar characteristics.

2.3.3 Income as a Socio-economic Factor

The American Psychological Association (APA, 2007), task force on socio-economic factors defined Income as wages, salaries, profits, rents and any flow of earnings received. The report further maintained that, income can also come in the form of social security, pensions, interests or dividends, royalties, trusts or other governmental, public or family financial assistance. Wisdom (2008) explained that, income can be looked at in two terms, relative and absolute incomes. Relative income on the other hand dictates a person or family's savings and consumption based on the family's income in relation to others. According to Wisdom (2008) income is commonly used measure of socio-economic status (SES) because it is relatively easy to figure for most individuals.

Weller (2005) observed that, income inequality is most commonly measured around the world by the Gini Coefficient, where O corresponds to perfect equality and 1 means perfect inequality. Low income families focus on meeting the immediate needs and do not accumulate wealth that could be passed on to future generation, thus increasing inequality. Families or individuals with higher and dependable income can accumulate wealth and focus on meeting immediate needs while being able to consume and enjoy luxuries and weather crises or storms.

2.3.4 Education as a Socio-economic Factor

According to American Psychological Association (APA, 2007) report indicated that education plays a key role in income. Median earnings increase with each level of education. The highest degrees, professional and doctoral degrees make the highest weekly earnings while those without a high school diploma earn less. Higher levels of education are associated with better economic and psychological outcomes (which means; more income, more control and greater social support and networking) the report further maintained that, education play a major role in skills sets for acquiring jobs, as well as specific qualities that stratify people with high socio-economic status from lower socio-economic status.

Education provides individuals or groups with the knowledge and that are necessary to advance themselves and the nation economically and socially.Education equips members of the society with the skills and knowledge they require to be employed in different jobs professions.The standards of education in your society depend on availability and accessibility of educational amenities.A society that has well-educated population flourishes because individuals are employable in well-paying jobs. The literacy levels of the extension agents has a significant influence in their interaction with rural farmers through the use of ICT.

2.3.5 Occupation as Socio-economic Factor

According to Scott (2005) occupation encompasses both income and educational attainment. Occupational status reflects the educational attainment required to obtain the job and income levels that vary with different jobs and within ranks of occupations. Additionally, it shows achievement in skills required for the job. Occupational factors measure social position by describing job characteristics, decision making ability and

control. Many economic scales rank occupations based on the level of skills involved from unskilled to skilled manual labour to professional, or use a combined measure using the education level needed and income involved.

2.4 Information Communication Technology

There is a broad consensus in the literature on the definition of ICT especially on its electronic nature andinformation technology (IT) based system (Omotayo, 2005).ICTs can be broadly interpreted as technologies that facilitate communication and the processing and transmission of information by electronic means. This definition encompasses the full range of ICTs from radio and television to telephone (fixed and mobile), computers and the internet (CTA.2003).Food and Agriculture Organization (FAO,1993) defines ICT as technologies involved in collecting, procession, storing, retrieving, disseminating and implementing data and information using microelectronics, optics and telecommunications and computers. Africa Development Bank (ADB, 2003) describes ICT as a set of activities that facilitate by electronic means the processing, transmission and display of information.

Greenidge (2003) also defines ICTs as those technologies that can be used to interlink information technology devices such as personal computers with communication technologies such as telephones and their telecommunication networks. ICTs are a range of electronic technologies which when converged in new configurations are flexible, adaptable, enablingand capable of transforming organizations and redefining social relations (Chapman andSlay maker, 2002). Helmut (1998), cited by Akpore (1999), states that, the technological changes that have influenced our lives in recent years, information technology (IT) has had the greatest impact. This will continue at least until the end of the

first half of the century, when other major technological breakthroughs in the area of new materials, biotechnology, or energy, may provide entirely new ways of living.

An information society is one that makes the best possible use of ICT. Martin(1995) supports this view by describing it as a society in which the quality of life as well as prospects for social change and economic development depend increasingly upon information and its exploitation. In such a society, living standards, patterns of work and leisure, the education system and marketplace are all influenced by advances in information and knowledge. This is evidenced by an increasingly array of information-intensive products and services (Martin, 1988).

Annan (2002) notes that the information society is a way for human capacity to be expanded, built up, nourished, and liberated by giving people access to tools and technologies, with the education and training to use them effectively. There is a unique opportunity to connect and assist those living in the poorest and most insolated regions of the world. The problem of provision of adequate information to the society is a major hurdle that most nations, especially developing countries, are encountering. The information society or information age is a phenomenon that began after 1950, which brings challenges as we seek to integrate and expand the universe of print and multimedia sources. The two terms are often used to describe a cybernetic society in which there is a great dependence on the use of computers and data transmission linkages to generate and transmit information (Bruce, 1995).

The African Information Society (AIS, 2005) document comments that Africa should build (byyear2010),an information society in which every man, woman,child,village, public and private sector office has secured access to the use of computers and telecommunication media. The objective is to provide every African with

the possibility of using the communication and data processing available everywhere else, just like any other citizens of the world.Communications affect the change in the receiver's behavior (knowledge attitude and skills) that occur as a result of the message received. Communication can be considered effective if it results in intended behavior of the receiver, audience or target group, sending a message is only one side of the communication exercise. Finding out the extent of its diffusion through the target group and its impact in terms of the effect of the message in creating behavioral changes as a result of applying the new knowledge is another. Feedback is a response from the receiver to the source of the message feedback is a control device and an important indicator of the success of communication feedback advocacy as well as areas requiring modification and further enquiry (Awojola, 2007).

ICT has great potentials in rural development in developing countries. Omotayo (2005) observes that in the context of changing paradigms in agricultural extension, where linear information flows, new actors such as NGOs, private companies, national agricultural research centers, universities and international donors are emerging in the technology transfer pathway. The potentials of ICT to make agricultural extension in developing countries more effective therefore appear unassailable.With use of radio, televisionand short message service,as well as the use of telephone, can effectively be usedin community mobilizationand learning and action (Arokoyo,2005).

Modern agricultural extension system encourages the development of positive attitude amongst scientists to appreciate the knowledge, experience and capacities of the local people in the research development process (Amalu, 1998). ICT as an extension tool would enhance information flow in the application of agricultural extension services (Adebayo andAdesope, 2007). Arokoyo (2005) reports that, to date, radio and television

have been the major ICT used in agricultural extension delivery in Nigeria. Despite the importance of these channels, they are principally owned and controlled by government. This means that only programmesthat are government – based are featured. The information contents of these channels are more provider-driven than user-driven and thishas serious implication for delivery (Arokoyo, 2005).

2.5 ICT Devices Used in Agricultural Extension

With respect to ICT use, the interest of extension is communication for development defined as " an innovative way of reaching and interacting with people more effectively where ever they may be"(FAO, 1998). The ICT devices that have great potentials for use in agricultural extension according to Arokoyo (2005) includeradio, television, mobile telephones, internet services, computers, overhead projectors and rural radio. Others includes; cameras, videos, e-mails, contact databases and systems. The technologies covered as regards to this study are as follows:

2.5.1 The Use of Radio and Television

The use of mass media in agricultural information dissemination is useful in reaching a wide range of audience at a very fast rate. They are useful as sources of agricultural information to farmers and as well constitute methods of notifying farmers of new developments and emergencies in agriculture. They could equally be useful in stimulating farmers' interest in new ideas and practices (Adam, 2002). Radio andtelevision are the most effective tools in communication for the support of developments. Television can provide an illiterate person valuable instruction and education in agriculture, health, population control, sanitation and other aspects of his daily life. (Hussein, 2009b).These two channels are suitable for Nigerian situation where there are poor roads for communication. Radio and television can get information across

to every nook and cranny of the rural areas where it is very difficult to make direct contact between the farmers and extension agents. Both channels are very useful to the illiterate farmers and can use the new idea themselves.

Studies conducted by Rogers andNichoff, (2002) indicate that radio reaches largest audience in most developing countries like Nigeria. Ogiowo (1999) reports that most farmers listen to radio even though many of them do not own a radio. Similarly, Williams (1999) reports in his studies that extension agents, radio and fellow farmers and government personnel, radio and cooperative union staff are the most frequently and regularly used sources of information among farmers.

Television also combines vision with sound andserves an important medium for transmitting information directly to a mass audience. Television signals can be broadcast from a land-based transmitter, by satellite or through the use of cables. However, in many countries, television transmission and sets are still restricted to urban areas and the potential of television for rural extension will remain low until become more widely available. Television sets are much more expensive to buy and repair than radios and programme production costs are also far higher. Where television has been used for rural extension communication access and impact have been increased by group viewing followed by discussion.

2.5.2 The Use of Internet

The Internet is a global collection of many types of computers and computer networks that are linked together. It is increasingly becoming the solution to manyinformationproblems, information exchange, and marketing(Adesanya,2002) Eseyin(1997) describes the Internet as a mixture of many services with the two most commonly used being electronic mail (e-mail for short) and the World Wide

Web(WWW). It plays a significant role in education, health, politicalprocesses, agriculture, economyand businesses.Woherem (2000) stated that with Internet connectivity, one can do business all over the world without physical contact with the buyer or the need for a business intermediary.

Prior to the introduction of internet facilities in Nigeria with the effort of the Nigeria Internet group by late 1984, communication andinformation transfer in organizations have mainly been with the use of file systems and paper mails. Its attendant problem had been delayed services or total ineffectiveness in some cases due tobureaucraticbottlenecks and logistics.However, with the introduction of information communication technologies, information transfer within and outside organizationshas been very effective. Information communication technology (as a major tool of information processing in organizations) was first developedby the United StatesDepartment of Defense Programme.

The Nigeria internet initiative started with the effort of the Nigeria internet group by late 1994. During this period, the only access to the Internet was provided by Nigeria Telecommunications Ltd (NITEL). Based on the economic reliability and the peoples need to be part of the global happening, by the end of 1997 NITEL provided an Internet backbone of2Mbps Bandwidth immediately, strategically located within the country. ObafemiAwolowo University, Ile-Ife, Nigeria is consistentlyranked as one of the ICTs leaders amongst universities in Nigeria. In 1981 it became the first university to establish an independent satellite to the Internet (IdowuandAdagunodo 2004).

2.5.3 The Use of Mobile Phones

The mobile telephone represents a new technology that has revolutionized the way we live and communicate, by rendering meaningless concept of “unreachability” people

can communicate with each other people instantly, with the assurance of finding the person they are looking for at the other end, unlike the traditional telephone. With the integration of various services, including accessing the internet from the mobile telephone, the mobile telephone increasingly appearing to be a “converging point” various technologies (Tickoo, 2003).Mobile phones were once the tool of the rich and busy executives who could afford the luxury. Mobile phones are now the ICT that is reshaping and revolutionizing communications globally. Its impact on the economic activities of nations, businesses, and small entrepreneurs is phenomenal. According to Marcelle (1999) availability of this new technology has tended to restructuring of economic, political, and cultural relations among states.

2.5.4. Overhead Projectors

According to FAO, (1998) films, colours, slides, filmstrips and overhead projectors transparencies are useful as teaching aids bringing colour, variety and interest to an extension talk. However, they all require specific equipment and electricity. Extension agents are therefore more likely to use them in training centersand schools although some slide projectors can be adapted to work from a 12-volt car battery. Films, filmstrips and slides are best used at night or in a room with curtains drawn or shutters closed. Day light screens can be used for small groups. Overhead projectors can be used in day light provided that the sun is not shining on the screen or wall on which the image is projected.Colour slides can be selected and put in a sequence by the extension agent. An extension agent can produce his/her own slides to suit his/her purposes provided he/she has access to a camera , film and film processing facilities.

According to FAO (1998), slides can be easily modified or updated by replacing one or more slides. If they are kept dry and free from dust and fingerprints they will

remain in good condition for many years. An extension agent can provide his/her own spoken comments on the slides, or a commentary can be recorded on an audio cassette. With synchronized equipment, the tape can be modified so that slides automatically changed at appropriate point

2.5.5. The Use of Mobile Cinema

FAO (1998)the main advantage of film shown through the use of mobile cinema as a mass media for agricultural extension is that it is visual, the audience can see as well as hear the information it contains. It is easier to hold audience's attention when they have something to look at. It also makes it possible to explain things that are difficult to describe in words, for example the colourand shape of an insect pest or the correct way to apply inorganic fertilizer as wellas the correct way to transplant seedlings. Moreover, by using close-up shots and slow motion, action can be shown in far greater detail than to see possible watching live discussants.

2.5.6. The Use of Videos

Video as a mass media has more to offer than film since video programmes can be made far more quickly in multiple copies, and the lightweight video copies are easy distribute. As video equipment, television monitors and video cassette recorders becomemore robust, it will be possible to use mobile units to show up-to- date programmes made within the country and within the area to large number of rural farmers. The tape can be showed down, wound back to repeat a particular action or held on a particular frame while the extension agent explains a point. The same mobile units could carry portable video cameras to collect materials for new programmes. The main limitation to viewing is

that, only 20-30 people can satisfactorily watch a video programme on a normal television set while several hundred can see a film projected on to a large screen according to (FAO, 1998).

2.6 Factors Influencing theUse of ICT on Agricultural Extension Services

According to CTA (2003), the following are some important factors influencing the use of ICT in extension:

1. Telecommunication access policy: This has been discussed under the major constraints limiting use. The policy may make or mar the use of these technologies. The people (clients) must be involved in the choice and development of the technological options to be used in an extension outreach.
2. Availability and affordability of the telecommunication infrastructure, equipment and support. For the rural communities, the research and extension organizations and other service providers and the nation in general. Specifically, the availability of equipment including phones (fixed and mobile), computers, radio, TV, video cameras, a robust telecommunication system, preferably with reliable broad band with internet access and assured operational funds.
3. Capabilities and attitudes of farmers and the extension personnel at all levels.
4. The incentives to innovate with ICT particularly by the Non-Governmental Organizations and the private service providers. These could be in form of tax reliefs or duty exemptions on imported ICT equipments.
5. Opportunities for training and skills development especially for farmers, women and youths and extension workers.

6. Ability of both the public and private extension service to "conceptualize and design demand responsive electronic services" similar to a Question andAnswer Service (QAS).
7. Educational/computer literacy levels: The higher the more is the tendency to use ICT.
8. Ownership of decision processes regarding ICT choices e.g. the establishment operation of rural/community radio stations.

2.7Major Constraints to ICT use in Extension Delivery in Zamfara State

Arokoyo (2003) highlights the following constraints to ICT use in Nigerian extension delivery:

1. Despite the worldwide ICT explosion, most of the research and extension organizations seem not to be fully ICT-ready.
2. Poor and erratic funding to the National Agricultural Research System (NARES).
3. Poor ICT infrastructural development as clearly seen in the very few and poor telephone lines, compounded by erratic, limited and unstable power supply and very low level capacities of gateways to international networks/satellite systems.
4. High cost of power either through the national grid or stand-by generators.
5. Very high cost of telephone services either by landlines or GSM. It has been estimated that Nigeria has the highest rate for GSM calls in the world.
6. Limited access to computer and an even less access to the Internet, making even basic inter- and intra-organizational networking for information exchange almost impossible.
7. Policy inconsistencies by government in both the telecommunication and agricultural sectors resulting in low-level private sector participation investment for development.

8. High-level rural poverty.
9. High-level illiteracy of farmers and computer illiteracy among scientists and extension workers.
10. The limited coverage of States and National AM/FM broadcasts is compounded by the near absence of rural radio.
11. Commercialization of government radio and television stations has resulted in exorbitant cost for farm broadcasting

Ani (2007), identified the following challenges to ICT use in agricultural extension:

1. Policy considerations:The formation and implementation of policies on the ICT sector in most developing countries is still very rudimentary and relatively new and therefore, calls for an integrated set of laws, regulations and guidelines that shape the generation, acquisition and utilization of ICT. Most countries lack policies and strategies that facilitate the harnessing of new ICT for rural development programmes and extension service, and where policies have been formulated, proper implementation plans are needed. At times there could be policy inconsistencies in the sector that discourage private sector investment for development.

2. High cost of ICT:The cost of modern ICT such as computers and the internet remains a strong factor that can be a deterrent in the use of such facilities in many developing countries like Nigeria. Although market liberalization has led to the entry of several private sectors in the provision of ICT, service is inadequate in terms of robustness, congestion and noisy lines.

3. Infrastructure:The telecommunication and electricity infrastructure in developing countries is lacking or poorly developed in rural areas where extension is done.

These infrastructures should serve as the prerequisite to many of the modern ICT, for optimum performance and to achieve the desired objectives. Though satellite and wireless technologies are now in use in the country, they are developed around urban cities.

4. Lack of adequate local content and language barrier:informationavailable through ICT is mostly in English, which the majority of the rural residents cannot read. There is a marked shortage of relevant materials in local languages that responds their needs. Various local, national, regional and international organization have useful information and resources (statistical, bibliographic, factual and fill text) of relevance to rural communities and extension work packaged as print, as audio tapes, radio and television programmers, video, CD-ROMs and on the world wide web. Extension has a vital role in sourcing information, decoding it and adapting it to the local conditions of their clientele.
5. Gender insensitivity:in developing countries, men and women play different productive roles in rural development and extension services and have different needs and preferences. Women produce more than half of the world's food (Ani, 2004), and face many problems in addressing food security and rural development issues. These include weak extension services, non-adoption of technologies, low status and therefore non-involvement in decision-making and policy making, varied and heavy workloads, poor access to credits and lack of access to education and training (Munyua, 2000). When new technologies are introduced, women have often been left out of initiatives associated with new ICT. Rural women however, have wisdom and indigenous knowledge that is rooted in culture, traditions, values and

experience. Their method of communication and information exchange should thus be harnessed and complimented with new ICT.

6. Low-level ICT readiness: In spite of the worldwide ICT explosion, most of the research and extension organizations in the country, and indeed of the developing countries themselves, seem not to be "ICT-ready". This could be traced to poor funding, rural poverty, limited access to computers and even worse, access to the internet, making basic inter and intra organizational networking for information exchange almost impossible.
7. Limited and very high cost of telephone service either by landlines or GSM: It has been estimated that Nigeria has the highest GSM call rates in all developing countries that have the facility (Arokoyo, 2005). Whereas the telephone is part of everyday normal life in developed countries and ordinarily taken for granted, it is a different matter in developing countries, where it is either non-extent, terribly limited, services very abysmal and cost astronomical.
8. There is erratic and unstable power supply and high cost of alternative power through standby generator.
9. The limited coverage of states and national AM/FM broadcasts is compounded by near absence of rural radio in the country.
10. Commercialization of government and private radio and television has resulted in exorbitant cost for farm broadcasting.

2.8 Review of Empirical Studies

The researcher compared the past related research studies conducted by other researchers in the field and the present research study.

SalauandSaingbe (2008) carried out a research study titled access and utilization of ICTs among agricultural researchers and extension workers in selected institutions in Nasarawa State, Nigeria. Descriptive survey design was used for the study. The population of the study comprised forty five (45) research fellows and forty-five (45) extension workers randomly selected from three higher institutions and Agricultural Development Project (ADP) inNasarawa State. Fivespecific objectives, five research questions and five null hypotheses were formulated for the study. The null hypotheses were tested at 0.05 level of significance using regression analysis. Findings of the study revealed that, both agricultural researchers and extension workers had access to ICTs as well as the use of ICT.

The present research study is similar to the past research study in the title.The present research study used only extension workers without researchers as used by the past research study. The past research study was conducted in Nasarawa state, while the present research study was conducted in Zamfara State, Nigeria.

Abdulsalam,AkinolaandBuhanhot(2008) conducted a research study titled problems and prospects of ICTs in agriculture'. Descriptive survey design was used for the study. The population of the study consisted of sixty (60) research fellows from Institute for Agricultural Research (IAR)Zaria andDakace village in Kano State. Twenty (20) researchers were purposively sampled. Four specific objectives, four research questions and two null hypotheses were formulated for the study.The null hypotheses were testedat0.05 level of significance. Findings of the study revealed that, educated respondents were more aware andhigh level of ICT use than those without formal education.

The present research study is similar in the title, and the research design.The present research study was different from the past research study in the sense that; the present research work used extension agents but the past study made use of researchers.Multi-stage samplingtechnique was used with the sample population from Kaduna and Kano States.

Lucky and Achebe, (2012) conducted a research study titled; ICT and agricultural information dissemination; Case study of IARSamaru, Zaria. Descriptive survey design was adopted for the study.One hundred and twenty (120) respondents formed the population of the study who selected through random samplingtechnique. Three specific objectives, three research questions and three null hypotheses were stated for the study. The three null hypotheses were tested at 0.05 level of significance. Findings of the study indicated that, there were low level deployment of ICT in Agricultural information dissemination and therefore left rooms for improvement.

The present research study is similar to the past research study in the title and design of the study having both studies used descriptive survey design.The present research study differ with the past research study in the study areaZamfara state was used, while the past research study was carried out in Kaduna State, Nigeria

GyataandAbdullahi (2012) carried out a research study titled "problems associated with the use of internet facilities by rural farmers and extension workers in Benue State, Nigeria". Descriptive survey design was used for the study, population of the study consisted of all rural farmers and all extension staff of Benue State Agricultural and Rural development Authority (BNARDA). A total of one hundred and Ninety-three (193) respondents comprising rural farmers and extension workers were purposively selected from all the Local Government Areas (LGAs)in Benue State. Two specific objectives,

two research questions and two null hypotheses were formulated for the study. The two null hypotheses were testedat 0.05 level of significance. Findings of the study revealed that, high cost of computers airtime as well as skills, knowledge and awareness were the socio-economic characteristics that affected the respondents in the use of internet facilities.

The present research study is similar to the past research study in the use of survey research design.The present research study differ from the past research study in the title having covered only aspect of the present study. Also, the past research study used rural farmers and extension agents as respondents, while the present research study used extension agents.Purposive sampling technique was used in selecting the sample size, while in the present research study multi-stage sampling procedure was used. The past research study was conducted in Benue state Nigeria, while the present research study was conducted in Zamfara State, Nigeria.

Fadiji, Atala, OmokoreandAbdulsalam(2013) carried out a research study titled Village extension agents' (VEAs) socio-economic characteristics as factors in usage of ICTin North-West Nigeria. Descriptive survey design was adopted for the study. The population of the study was two hundred and four (204) VEAs sampled as respondents using random sampling technique. Three specific objectives, three research questions and three null hypotheses were formulated for the study. The null hypotheses were tested at 0.05 level of significance. Findings of the study showed that, significant positive correlation existed between access to ICT, perception of government policy and on customs/tradition and ICT usage.

The present research study is similar with the past research study in the title. The present research study is also similar to the past research study in the research design. Both studies are conducted in the North-west geo-political zone, Nigeria.

Yakubu, AtalaandAbubakar(2013) conducted a research study titled assessing the effects of socio-economic factors on ICT adoption among extension workers in the North-west zone of Nigeria. Three hundred and twenty three (323) respondents constituted the sample of the study selected through random sampling procedure. Descriptive survey design was adopted for the study. Four specific objectives, four research questions and two null hypotheses were formulated to guide the study. The null hypotheses were tested at 0.08 level of significance using chi-square statistics. Results of the study indicated that, there was low adoption of ICT devices among the extension workers.

The present research study is similar with past research study in the title.The present study used descriptive survey design similar to what was used in the past research study.The past research study was conducted in the North-West Geopolitical zones of Nigeria, while the present research study was conducted in Zamfara State only.

Abubakar, Atala and Yakubu (2013) conducted a research study titled "Use of ICT among agricultural extension agents in Kano State, Nigeria. Survey research design was used for the study. Three research questions and three specific objectives were formulated to guide the study. One null hypothesis was formulated and was tested at 0.05 level of significance. 221 were randomly selected as sample size of the study. Structured questionnaire was used as an instrument for data collection. Descriptive statistic in the form of frequency and percentages were used to answer research questions while PPMC was used to test the null hypothesis. Findings of the research revealed that; socio-economic characteristics of the extension agents have positive correlation on ICT use

among extension agents in Kano State. It was concluded that, the benefits of using ICT were not fully utilized by the extension agents due to factors associated with low income, training awareness and accessibility to ICT devices.

The present research work is similar in the title and use of agricultural extension agents as respondents. However, the present research is different with the past research work in the following ways; the past research study used random sampling technique while the present research study used multi-stage sampling procedure. The past research work was conducted in Kano State while present was carried out in Zamfara State, Nigeria.

Denso, Mamo and Jeana (2013) carried out a research study titled; Analyzing socio-economic factors affecting the use of ICT among farmers in central highlands in Ethiopia. Survey research was adopted for the study. Four objectives and four research questions were formulated for the study. Two null hypotheses were formulated for the study. Population of the study comprised all the farmers in central highlands in Ethiopia while sample size was selected through multi- stage sampling procedure. Structured questionnaire was used as an instrument for data collection. Frequency and percentages were used to analyzed the research questions. Chi-square statistic was used to test the null hypothesis at 0.05 level of significance. Results of the study shows that; age, sex, educational status and distance from the nearby market have significant influence on the use of ICT in agricultural extension among farmers in the area of the study. The research study recommended that, concerned stakeholders and partners should attempt to address those factors influencing the use of ICT among farmers.

The present study is similar in title with past study and also similar in the use of survey research design as well as in the sampling technique. However, the present research is different with the past research in that the past study used farmers as sample while the present research work used agricultural extension personnel. The present research study was conducted in Nigeria while the past research study was carried out in Ethiopia.

Adetumbi, OlaniyiandAdewale(2013) carried out a research study titled: assessment of use of selected ICT for extension service Delivery: Implication for Agricultural Development in Nigeria. Descriptive survey design was adopted for the study. The population of the study was Eighty Four (84) extension workers, out of which forty-two were selected as sample through random sampling technique. Five specific objectives, five research questions and two null hypotheses were formulated for the study. The null hypotheses were tested at 0.05 level of significance. Findings of the study revealed that; access to various ICTs tools especially Radio and Mobile phones were found to be relevant to farming operations and there was no significant relationships between ICT training of extension workers and the level of use of ICT.

The present research study is similar in title with the past research study: assessment of perception of use of ICT among agricultural extension agents in Zamfara State, Nigeria. The past research study used survey design while the present research study also used survey design.The present research study is different from the past research study in that; the present study studied all the ICT devices used in extension delivery while the past research study used selected ICT tools. The past research study covered Nigeria as a whole while the present research study was conducted in Zamfara State, Nigeria.

EgbuleandAdewale(2013) conducted a research study titled “availability and use of mobile phones to information dissemination by public extension agents in Delta state, Nigeria”. Descriptive survey was used for the study. Sixty four (64) respondents constituted the population of the study sampled through multistage sampling technique. Three specific objectives, three research questions and three null hypotheses were formulated for the study. The three hypotheses were tested at 0.05 level of significance. Findings of the study revealed that; mobile phones were frequently used in the dissemination of agricultural information.

The present research study is different to the past research study in title;Descriptive survey design was used in the present study as in the past research study.The present research study was also similar multi-stage sampling procedure was used in both the past research studies The past research study examined only mobile phones, while present research study studied different ICT devices used in agricultural extension delivery system. The past research study was conducted in Delta State, Nigeria, while the present research study was conducted in Zamfara State, Nigeria.

Ajayi, Alabi and Akinsola (2013) conducted a research study titled “knowledge and Perception onExtension Agents on ICT use in Extension Service Delivery in OndoState Nigeria. Survey research design was adopted for the study. Four objectives and research questions were formulated. Three null hypotheses were formulated to guide the study. Fifty extension agents were randomly selected. Validated questionnaire was used to collect from the respondents and appropriate statistical tools were used to analyze the data collected. Results of the study indicated that; there were significant association between extension agent’s awareness on ICT and their membership of professional associations and also significant relationships existed between extension agent’s knowledge on ICT

use and their perception towards ICT use. The study recommended that adequate information on various relevant ICT suitable for extension service should be given to extension agents so that they can improve their knowledge on ICT and also help them to develop more positive perception that will enhance the future use of these devices in extension.

The present research work is similar to the past present work on both the title research design and sampling technique. The present research study was conducted in Zamfara State, Nigeria while the past research work was carried out in Ondo State, Nigeria.

2.9 Summary of Reviewed Literature

The literature reviewed showed that the socio-economic factors studied refers to collectively desired resources such as material goods, money, power, friendship networks, health care, leisure time or educational opportunities. The review identified three major socio-economic variables, namely income, level of education and occupation. The review used the concept of ICT as tools or devices that facilitate communication and the processing as well as transmission of relevant agricultural informationand improved farming technologies to farmers through the use of radio, televisionand mobile phones. The review alsolooked at the potential impact of ICT in agricultural extension delivery. Factors influencing the use/adoption of ICT in agricultural extension services were also discussed. The constraints associated with the use of ICT in agricultural extension such as poor infrastructural facilities poor access to ICT tools, high costs of ICT devices and limited services coupled with erratic power supply in Zamfara State and Nigeria in general were discussed.

From the empirical studies reviewed by the researcher, it was clear that, the past researchers paid more attention on just identifying the socio-economic characteristics of the respondents without determining the perception of extension agents on the use of ICT in agricultural extension Programme. The current research study examined the roles played by level of income, educational attainment, household/family size and age on the use of ICT by agricultural extension agents in Zamfara State, Nigeria. Furthermore, to the best of the researcher there was no any similar study conducted in the state on the influence of socio-economic factors on the use of ICT in Zamfara State.

CHAPTER THREE

RESEARCH METHODOLOGY

The chapter is organized under the following sub-headings.

3.1 Research Design

3.2 Population of the study

3.3 Sample size and Sampling Procedure.

3.4 Instrument for Data Collection

3.4.1 Validation of the Instrument

3.4.2 Pilot study

3.4.3 Reliability of the Instrument

3.5 Procedure for Data Collection

3.6 Procedure for Data Analysis

3.1 Research Design

Survey design was adopted for the research study. According to Adamu (2008) survey research design is detailed and factual in collecting information from large number of people and is quick and cost effective. Osuala,(2005) described survey design as a design that gives the accurate assessment of the characteristics of the whole population of people.

3.2 Population of the Study

Thepopulation for the study was475extension personnel/agents working withZADP, Zamfara state.

One hundred and fifty six extension agents posted to four LGAs in Zamfara Central, namely; Bungudu, Gusau, Maru, andTsafe were sued. Zamfara West Senatorial

District had196agricultural extension agents, working in six LGAs, namely; Anka, Bakura, Bukkuyum, Gummi, Maradun, andTalata-Mafara. Zamfara North had 133agricultural extension agents obtained from four LGAs in the district, namely; BirninMagaji, Kaura-Namoda, ShinkafiandZurmi. The breakdown of the population of extension agents for the study in the 14 LGAs are shown in Table 1.

Table1: Population of the Study

S/№	Districts	LGAs	Number of agricultural extension agents	70% sample size
1.	Zamfara Central	Bungudu	36	
		Gusau	40	
		Maru	32	
		Tsafe	38	
		Sub-total	**146**	**104**
2.	Zamfara West	Anka	30	
		Bakura	30	
		Bukkuyum	32	
		Gummi	36	
		Maradun	32	
		Talata-Mafara	36	
		Sub-total	**196**	**140**
3.	Zamfara North	BirninMagaji	32	
		KauraNamoda	36	
		Shinkafi	32	
		Zurmi	33	
		Sub-total	**133**	**96**
		Grand total	**475**	**340**

Source: Departmentof Agriculture and Extension Services (2016)

3.3 Sample Size and Sampling Procedure

The researcher selected 340agricultural extension agents (70%) as samplefrom all the 14 LGAs in the state.Multi-stage sampling technique was used to select the respondents.Stage 1 involved the selection of the three districts. Stage 2, involved the selection of all the LGAs in each of the zones. Lastly, stage 3 involved the selection of 70% of the extension agents from each of the LGAs. The breakdown is as follows;

Zamfara Central comprised of 104 agriculturalextension agents who were randomly selected from the four LGAsfrom Zamfara West, 140 agricultural extension agents were randomly selected from the six (6) LGAs. In Zamfara North a total of 96 agricultural extension agents were selected from all the fourLGAs.

3.4 Instrument for Data Collection

Structured questionnaire was used as instrument for data collection. The structured questionnaire was designed to conformed with the research questions of the study. According to Daramola (1992) every item on the questionnaire must be related to the research questions and the null hypotheses of the research study.

The structured questionnaire was divided into four (4) sections. Section one contained items on the socio-economic characteristics of the respondents. The second (2) section of the questionnaire contained checklists of ICT devices available for use by the extension agents. Section three (3)contained items on the perception of extension agents on the levels of use of ICT tools.Section fourcontained items on the perception of the extent to which socio-economic factors of the extension agents influenced the use of ICT in agricultural extension service delivery system in Zamfarastate. Nigeria.

The questionnaire was rated using 4 points rating scale.

SA- Strongly Agree 4 points

A- Agree 3 points

DA- Disagree 2 points

SD- Strongly Disagree 1 point

Similarly other parts of the questionnaire sought information from the respondents on the socio-economic factors on ICTs used by the extension agents as well as the level of

educational attainment, level of income, household size, years of working experience as well as age of the extension agents in the study area.

The questionnaire was also rated using 4 points rating scale of:

VO- Very Often 4 points

O- Often 3 points

RU- Rarely Used 2 points

NU- Not Used 1 point

All the Very Often andOften were classified as Often while all the Rarely Used Not Use were categorized as Not Use. A benchmark of 2.5 was considered as often while a benchmark of less than 2.5 was considered as not used.

3.4.1. Validation of the Instrument

The structured questionnaire was presented to five research experts in Agricultural Education Section of the Department of Vocational and Technical Education, Ahmadu Bello University, Zaria. All corrections and suggestions by the five experts were incorporated into the final draft of the questionnaire to ensure face validity of the questionnaire.

3.4.2 Pilot Study

The researcher conducted a pilot study in TuretaLGA in Sokoto State. The area has similar characteristics with the location of the study. Twenty EAs were randomly selected and were given the copies of the questionnaire to respond to the pilot study.The researcher personally administered the copies of the questionnaire to the 20extension agents who were involved in the pilot study. The completed copies of the questionnaire were collected after filling for statistical analysis to determine the reliability co-efficient of the research instrument.

3.4.3 Reliability of the Instrument

The reliability co-efficient of the instrument was determined by the statistical analysis of the data collected from the pilot study. Test-retest method was used to determine the reliability coefficient of the instrument.Theinstrumentwas divided into two "halves of 'odd' and 'even' numbers". The researcher used Spearman Brown Prophecy Formula (SBPF) to calculate the reliability coefficient for the instrument. The reliability coefficient obtained was 0.78. The instrument was considered reliable and stable as put forward by American Education Research Association (AERA, 1999), which recommended reliability estimate of 0.60-0.80 as high and the instrument for which it is calculated as reliable and stable.

3.5 Procedure for Data Collection

The researcher collected a letter of introduction from the Department of Vocational and Technical Education Ahmadu Bello University, Zaria. The letter was used to introduce the researcher to the respondents during the period of data collection. The letter was presented to the directors' of agriculture and extension services in all the fourteen LGAs in Zamfara State. The researcher used the services of three (3) trained research assistants. Formal interaction between the researcher and the extension agents to create rapport was made.

The researcher with the help of the trained research assistants personally administered the questionnaires to the respondents. The research assistants were trained on the objectives of the study so that they can faithfully administer the questionnaires. They were also trained on the most convenient time to administer the research instrument to the respondents as well as the importance of locating all the sampled population to ensure acceptability and accuracy of the results of the study. All the 340 extension agents

were given the copies of the questionnaire to fill and return to the researcher. All the copies of the structured questionnaire were filled and returned. The researcher spent four weeks in the distribution and retrieval of the copies of the filled questionnaire.

3.6 Procedure for Data Analysis

Data collected was analyzed using frequency, percentage and arithmetic mean statistics to answer the research questions.The descriptive statistic was used to answer research question 1, 2, 3 and 4 respectively. In calculating the mean opinion of respondents, the mean opinion of agreed option was obtained after adding the four point scale of agreed and strongly agreed. Then the sum total was divided by the number of respondents who chose both agreed and disagreed. In the same vein, the opinion of disagreed and strongly disagreed option was obtained by adding four point scale of agreed and disagreed, then the sum total was divided by the number of respondents who chose disagreed and strongly disagreed respectively.

Regression analysis was used to test all the null hypotheses at 0.05 level of significance.

3.6.1 Measurement of the Variables

The study considered two (2) sets of variables; dependent variables (the use of ICT) and independent variables (socio-economic factors). The independent variables were identified as follows.

Age (X_1): With age an extension agent is expected to gather more personal assets and therefore display a greater likelihood of investing in innovations. However, younger extension agents may be more flexible and more likely to use new technologies. Age was measured in years and categorized into younger and older extension agents.

Household size (X_2): It is assumed that, the larger thehousehold size the bigger the family responsibilities and the less likely the extension agent use of ICT. Household size was measured by the number of individuals under the care of the extension agents. It was categorized into low and high.

Years of Educational Attainment (X_3): Itis assumed that highly educated extension agents are more likely to use ICT to find solutions to their problems as well as disseminate valuable agricultural information to farmers. It was measured according to the number of years an extension agent took to acquire a level of education. (Primary education 6, Secondary school 12, Ordinary National Diploma 14, Higher National Diploma 16 and University Degree 17

Annual income (X_4): Increase in annual income is expected to have a positive bearing on ICT use as to increases the purchasing power of the extension agents all things being equal. It was measured in ₦/year and categorized into low and high.

Years of Working Experience (X_5): Extension agents with more years of working experience are more likely to use ICT. Years of working experience were measured based on the number of years spent working and was categorized into low and high.

Decision rule: The mean rating of 2.50 was used as the decision rule, score of 2.50 and above was regarded as agree while a score of less than 2.50 was regarded as disagree. Where the results of the calculated t-value was greater than the critical t-value, the null hypotheses was accepted, and vice-versal (Baba, 2009).

CHAPTER FOUR

PRESENATION ANDANALYSIS OF DATA

This chapter presents data generated for the study under the following sub-headings:

4.1 Answers to Research Questions

4.2 Testing the Null – hypotheses

4.3 Summary of Major Findings

4.4 Discussion of Major Finding

4.1. Answers to Research Questions

Personal Characteristics of the Respondents

Table 2: Distribution ofPersonal characteristics of agricultural extension agents in Zamfara state, Nigeria

Socio-economic characteristics	Freq	%	Mean	Std. Dev.
Age (years)			42.0	10.77
≤30	18	5		
31-40	98	29		
41-50	105	31		
>50	119	35		
Household size				
1-5	120	35		
6-10	134	39		
11-15	33	10		
16-20	53	16		
			14.0	2.09
Educational level				
Secondary Education	102	30		
ND/NCE	187	55		
HND/BSc	51	15		
Working Experience (years)				
1-6	18	5		
7-12	133	39		
13-18	172	51		
19 and above	17	5		
Annual Income (₦)/Annum			13.0	3.59
Less than 200,000	52	15		
201,000-400,000	66	19		
401,000-600,000	176	52		
601,000-800,000	26	8		
≥ 801,000	20	6	602,096	409781

Field Study, 2016

Table 2 shows that most (35%) of the respondents were above 50 years with a mean value and standard deviation of 42.0 and 10.77, respectively. Similarly, the household size indicates that majority (39%) fall between 6-10 members with a mean value and standard deviation of 14.0 and 2.09, respectively. Yet, educational level of the extension agents shows that most (55%) had ND/NCE educationand 30 percent of them obtained secondary school certificates while few (15%) were HND/BSc holders. Again, the working experience of the extension agents revealed that majority (95%) had worked for 7years and above. The mean distribution was 13 years, while, the income levels were distributed around the mean of 602,096 Naira and standard deviation of 409781 indicating

that majority of the extension agents fall within the range of 401,000-600,000 in terms of income earning.

Research Question One:What are the ICT devices available for use by agricultural extension agents in Zamfara state, Nigeria?

Table3: The ICT devices available for use by agricultural extension agents in Zamfara State, Nigeria

ICT devices	***Available**		***Not available**	
	Frequency	Percentage	Frequency	Percentage
Radio	336	98.82	4	1.18
Television	271	79.71	69	20.29
Mobile Phones	340	100.00	0	0.00
Overhead Projector	12	3.53	328	96.47
Computers	27	7.94	313	92.06
Internet Facilities	23	6.76	317	93.24
Cassette tape Recorder	11	3.24	329	96.76
Mobile Cinema	05	1.47	335	98.53

*Multiple responses Field Study 2016

The findings in Table 3 show that the most common ICT devices available for use by extension agents were mobile phone (100.0%), radio (98.8%) and television (79.7%). Others include computers (7.94%) and internet facilities (6.7%). Yet, the least available ICT devices were mobile cinema, cassette tape recorder and overhead projector (1.5%, 3.2% and 3.5% respectively).

Research Question Two:What is the perception of the level of use of ICT devices among agricultural extension agents in Zamfara state, Nigeria?

Table 4:Perceived level of use of the ICT devices among agricultural extension agents in Zamfara state, Nigeria

Level of ICT Use (perceptions)	Mean	SD	Decision
I used radio to disseminate valuable agricultural information to farmers	3.08	1.75	Agreed
I used radio to broadcast latest market information to farmers	3.11	1.76	Agreed
I used television for result demonstration of an established agricultural fact	2.51	1.58	Agreed
I used mobile phones to communicate to the farmers available market for crop, livestock and farm inputs as well	3.16	1.78	Agreed
I used mobile phones to inform farmers available sources of farm credit	3.19	1.78	Agreed
I used overhead projector to show how series of conventional farm operations are performed	1.81	1.35	Disagreed
I used computer to retrieve and store important agricultural information	2.82	1.68	Agreed
I used internet to access latest agricultural information	1.83	1.35	Disagreed
I used tape recorders to transmit recorded messages to farmers	1.74	1.32	Disagreed
I used mobile cinema to educate and enlighten farmers on new farm innovations	1.74	1.32	Disagreed

Field Study, 2016

Table 4 indicated thatthe use of radio to broadcast latest market information to farmers (44.7%), the use of mobile phones to inform farmers available sources of farm credit (42.4%), use of radio to disseminate valuable agricultural information to farmers (41.5%) were very often used ICT devices. Moreover, the ICT devices that are often used by the extension agents were; use of mobile phones to communicate to the farmers available market for crop, livestock and farm inputs and use of computer to retrieve and store important agricultural information. However,use of internet to access latest agricultural information;use of overhead projector to show how series of conventional farm operations are performed and use of tape recorders to transmit recorded messages to farmerswere not used for extension work in the study area.

Research Question Three: What is the extent to which socio-economic characteristicsof agricultural extension agents influences the use of ICT in

Zamfara state, Nigeria?

Table5:The extent to which socio-economic characteristics of agricultural extension agents influenced the use of ICT devices in Zamfara state, Nigeria

Responses on the extent to which socio-economic characteristics of extension agents influence the use of ICT	Mean	SD	Decision
The more educated an extension agent is the more likely he/she uses ICT devices	3.52	1.88	Agreed
Higher educational attainment improves the ability to handle information with ICT devices	3.66	1.91	Agreed
The age of an extension agent is more likely to influence the use of ICTs in extension services	3.54	1.88	Agreed
Large household size of an extension agent influence the use of ICT devices among	3.51	1.87	Agreed
Income level of an extension agent is more likely to enable the use of ICT devices	3.52	1.88	Agreed
Many years of working experience influence the use of ICTs among extension agents	2.72	1.65	Agreed

Source: Field Study, 2016

From the results of Table 5 the extent to which the socio-economic characteristics of the extension agents influenced the use of ICT devices in the study area was determined. The four point rating scale was used on the items responses to show the degree of agreement of each item on the scale. The study findings revealed that almost all the respondents strongly agreed that socio-economic characteristics namely; education, age, household size, income levels and experience influence the use of ICT devices. Overall, the percentage agreement is found within 94.8% – 59.4% indicating the extent of *a priori* level of agreement.

4.2. Test of Null Hypotheses

HypothesisOne:There is no significant influence of socio-economic characteristics on the use of ICTs by extension agents

Generally, most of the independent variables were significant in influencing the use of ICT among the extension agents as the R^2 of 0.5934 indicated. Hence, a total

variance of 59.34 percent in the dependent variable was explained by the independent variables in the model.Details of linear regression is shown in Table 6.

Table 6: Regression analysis showing theinfluence of socio-economic characteristics of respondents on the use of ICT

Variable	Coefficient (β)	SE	t-ratio	p-value
Constant	63.10	22.01	2.867	0.040
Age (x_1)	- 0.138	0.132	-1.045	0.080
Household size (x_2)	- 0.884	0.268	-3.299	0.000
Education (x_3)	1.516	0.205	7.395	0.000
Income (x_4)	1.964	0.241	8.149	0.000
Experience (x_5)	0.805	0.181	4.448	0.000

Dependent variable: ICT use
$R^2 = 0.5934$
R^2 adjusted = 0.5727

Field Study, 2016

The result of hypothesis test on the influence of socio-economic characteristics on the use of ICT by extension agents was shown in Table 6above. The influence of each socio-economic characteristic are as follows:

Age: The regression coefficient (β) was found to be - 0.138 with standard error of 0.132 giving a t-ratio of 1.045. This means that a unit increase in age results in a decrease in ICT use by 0.138 or 13.8 percent as other factors remain constant. This implies that use of ICT is more frequent among younger people than among the elderly. Thus, the use of ICT decreases as the extension agents grow older, which may be attributed to the excessive use of social networking rather than academic activities. Given the t-ratio, the result is not significant even at 10 percent.

Household size: The regression analysis coefficient (β) was also found to be a negative (-0.884) with standard error of 0.268 and a t-ratio of 3.299. This means that a unit increase in household size results in a decrease in ICT use by 0.884 or 88.4 percent. The implication of the findings is that more dependents' require more money and time to cater for at the expense of the cost of ICT use in time and money. Thus one can be overburdened by the household expenses that will make one reduce the use of ICT. Given the t-ratio, the result is significant at 1 percent.

Education: The coefficient (β) was found to be 1.516 with standard error of 0.205 giving a t-ratio of 7.395. This means that a unit increase in education results in an increase in ICT use by 1.516 or 151.6 percent (by one and a half times). The implication of this is that higher level of education influences higher use of ICT. This is not surprising as people with higher qualification tend to be holding key positions that especially in management or consultancy that demand more use of the ICT. Given the t-ratio, the result is significant at 1 percent

Income: The regression analysis coefficient (β) was also found to be a negative 1.964 with standard error of 0.241 and a t-ratio of 8.149. This means that a unit increase in household size results in a decrease in ICT use by 1.964 or 196.4 percent (by almost twice). This implies that as income increases by one unit ICT use increases significantly by 1.964 which is almost twice the amount. Thus, expectedly as the income increases one is likely to increases spending because more money is available for other things after satisfying basic needs. Given the t-ratio, the result is significant also at 1 percent.

Experience: The coefficient (β) was found to be 0.805 with standard error of 0.181 and a t-ratio of 4.448. This means that a unit increase in experience results in an increase in ICT

use by 0.805 or 80.5 percent. The implication of the finding is that agents with more years of working experience tend to use ICT more. This may be due to a number of trainings they may have undergone on the job as they advance in their career. They may have attended several workshops, seminars and conferences that will improve their productivity given the nature of their work. Given the t-ratio, the result is significant at 5 percent.

Hypothesis Two:There is no significant influence of the availability of ICT devices on the level of use of ICT devices by the extension agents

Simple linear regression was used to test the hypothesis. Availability of ICT was measured as the number of devices available for use by the extension agents at the time the study. The total available was computed into continuous independent variable. Similarly the level of use variable was transformed to continuous variable to satisfy the assumptions of linear regression.

Table 8: Result of linear regression analysis showing the influence of the availability of ICT devices on their level of use

Variable	Coefficient	SE	T	Sign.
Constant	58.031	0.136	426.698	0.0000
ICT availability	0.492	0.076	6.473	0.0000

Field study,2016

The study results in table 8 indicate that R^2 value of 0.51 and adjusted R^2 of 0.50 were obtained representing about 50 percent of variance of the level of use of ICT devices was explained by the independent variable in the model. The study finding further showed that the variable coefficient was 0.492 implying that one unit increase in the availability of ICT devices increase the level of ICT devices use by about 0.492 or 49 percent. Thus, there is significant influence of the availability of ICT devices on their level of use given the t-ratio of 6.473 and standard error of 0.076. The p-value is 0.0000 and therefore, the

null hypothesis stating that there is no significant influence of available of ICT devices on the level of their use is rejected.

4.3 Summary of Major Findings

The followings are the summary of major findings of this study:

1. ICT devices used for agricultural extension in Zamfara state were grossly inadequate or insufficient.
2. The level of use of ICT tools was generally low among extension agents in Zamfara state, Nigeria.
3. Socio-economic characteristics of extension agents such as income level, education, level of annual income and working experience have significant influence on the use of ICT in Zamfara state.

4.4 Discussion of Major Findings

The result of this study showed that income level of the extension agent has significant influence on the use of ICT as richer extension agents useICT more in extension services regardless of their educational attainment. It was found that extension agents earning more income tend to use more ICT in extension, than their counterparts earning lower income. The above agrees with that of Denso (2014) who observed that finance has positive influence on the use of ICT in agricultural extension. This author added that access to credit enhance the use of new technologies. In addition, the result showed that family size has significant influence on ICT use among extension agents because the larger the family size of an extension agent the less he/sheuses ICT in extension because size of family increased pressure on available resources. The above is in agreement with the finding of Yakubu (2013) who reported that extension workers who

had families to cater for might find it difficult to use ICT devices to disseminate relevant agricultural information to farmers. This is supported by Denso *et al.*(2014) who observed that large family size negatively affected the use of ICT by extension personnel.

The findings of the study showed that age influenced the use of ICT among extension agents in that elderly extension agent were less interested in the use of ICT, they preferred printed information materials then the electronic ones. Younger extension agents were flexible and used more ICT in extension services delivery. This result is supported by AgwuandChah (2007) who observed that elderly extension agents might be less interested in using Hi-tech communication devices they prefer oral and printed information channels which may be less efficient. This finding also agrees with that ofYakubu (2013) who reported that age and more years of working experience of an extension agent, he / she is expected to have acquired more personal capital, hence more capacity to use ICT devices in extension delivery services. Similarly Denso *et al.* (2014) reported that age has significant influence on ICT utilization, especially among the elderly who may be less interested in the use of such technologies.

The finding of this study showed that level of educational attainments of an extension agent significantly influenced level of use of ICT by extension agents. Education has the greatest influence on the use of ICT as it gives an extension agents background knowledge on the values of ICT. The more educated an extension agent is, the more likely he/she will use ICT in extension services. Higher educational attainment levels also helped extension agents to find solution to their educational problems and that of others in their professions. This result is supported by that of Milner andPlourde (2006) who observed that socio-economic variables such as education, income and occupation best represents socio-economic variableswhich influence an individual to use certain

occupational devices. AlsoYakubu (2013) reported that, the more educated extension agents are the more likely he/she will use ICT for finding solutions to their professional and other problems. In addition Fadiji*et al.* (2014)observed that, there is a positive and significant association between levels of educational attainment and ICT usage by extension agents. In the same vein, Denso *et al.* (2014) observed that education affect the use of ICT positively and significantly in Agricultural extension services.

Table 4.2 of the findings revealed that only mobile phones (100%), radios (98.9%) and television (79.9%) were available in all nooks and crannies of the study area. Other latest ICT devices are not readily available and this indicated that ICT devices for use by the extension agents during extension service delivery were in short supply or not available. This findings was supported by the views of Omotayo, (2005) that many rural areas of most developing nations like Nigeria, had no access to the basic telecommunication services that support key ICT tools like the internet, mobile cinema and computers.

There was low use of latest ICT devices in the study area. Table 4.3 revealed that most of the extension agents rely heavily on the use of radio, televisionand mobile phones for the dissemination of basic farm information and knowledge to farmers due to the non-availability of the latest ICT tools in the area of study. This implies that only a few number of extension agents have used the recent technologies in the extension service delivery. This finding is not in tandem with that of Adeyinka (2009) who reported that since 2002, Nigeria has witnessed a rapid expansion of the Internet services in all parts of the country. However, the finding agreed with that of Manu (2003) who reported that most developing countries, Nigeria inclusive still use different types of traditional information communication technology such as radio, television and mobile phones. He

further maintained that extension agents and other service providerswere experimenting with new digital opportunities that could be effectively used to exchange, process and transmit information and knowledge. The finding was further supported by that ofEgbula (2013) who reported that mobile phoneswere frequently used in the transmission of agricultural information to farmers in Delta State, Nigeria. Kiplang (2003) also reported that, the impact of the use of ICT in extension delivery still remained minimal in developing nations such as Nigeria as confirmed by arecent study to determine the diffusion of ICT in communicating agricultural information among researchers and extension workers in Kenya.

CHAPTER FIVE

SUMMARY, CONCLUSION ANDRECOMMENDATIONS

This chapter deals with the following sub-headings.

5.1 Summary

5.2 Contribution to Knowledge

5.3 Conclusion

5.4 Recommendations

5.5 Suggestions for further studies.

5.1 Summary

The study was conducted to assess the perception of the use of ICT among Agricultural Extension agents in ZamfaraState, Nigeria. The research study had threespecific objectives, threeresearch questions andtwo Null hypotheses.Survey design was used for the study. The population of the study was three hundred and forty (340) agricultural extension agents working with ZamfaraState agricultural development project. Multi-stage sampling procedure was used to select the sample size. Structured questionnaire was used to collect data from the respondents. All the questionnaires were returned filled and subjected to statistical analyses, four points rating scale was used.The two null hypotheses were tested using regression analysis at 0.05 level of significance.The study was based on the theory of social change founded by Rogers(1995)

Findings of the socio-economic characteristics of the respondents showed that age distribution wasbetween age bracket of 21-40 years with a mean value and standard deviation of 38.0 and 10.77 respectively. Similarly, the household size indicated that majority of the extension agents fall between 1-5 members with a mean value and standard deviation of 8.0 and 8.27 respectively. The results revealed that all the extension

agents are literate while the working experience of the extension agents showed that the mean distribution was 13 years with a class interval between 13-18 years, while the income levels were distributed around the mean of 602,096 Naira and standard deviation of 409781 indicating that majority of the extension agents fall within the range of 401,000-600,000 Naira in terms of income earnings/annum.

The result of the study alsoindicates that the income level of extension agents had significant influence on the use of ICT in extension delivery system as wealthier extension agents are more likely to use ICT devices to enhance their efficiency in information dissemination to farmers on improved farming practices andmodern technologies in farming. Hence the nullhypothesis was rejected.

It was also found that household size of extension agents has significant influence on the use of ICT. Extension agents with large household sizeand with more responsibilitiesand insufficient wealth find it difficultto use ICT devices. Null Hypothesis agrees with this finding and hence it was rejected.

It was found that age of the extension agents hadno significant influence on the use of ICT as the younger extension agents were more flexible and used ICT than the aged ones given that the t-ratio in the result is not significant even at 10 percent. The younger extension agents were easily influenced by the use electronic media to pass information and have less family burden to carter for. The test of null hypothesis affirmed this finding; hence, the null hypothesiswas accepted.

The study also showed that educational level of extension agents has a significant influence on the use of ICT because education improves the background knowledge of extension agentson the values of ICT,andhelp them understand the basic operation of the ICTand its usage and application in the field of agriculture. It was concluded that, the

more extension agents are educated the higher their use of ICT in extension services. The test of null hypothesis confirmed this: hence, the null hypothesis was rejected.

Findings of the study also revealed thatradio; television and mobile phones were the ICT devices available for use by extension agents while the least available tools were computers, overhead projectors,mobilecinema and internet facilities. Results from study also indicated that, the extension agents used the ICT tools to disseminate valuable agricultural information to farmers on improved farm practices, improved seeds and seedlings, market information and reliable sources of farm credit. However, the level of use of these ICT tools was very low as the study findings indicated.

5.2 Contribution to Knowledge

From the analysis of data collected the study revealed that;-

1. Educational level of extension agents had significant influence on the usage of ICT devices
2. Radio, television and mobile phone were the most commonly used ICT devices available among extension agents in Zamfara state ($p = 0.000$).
3. Extension agents in Zamfara state are literate who are within the age bracket of 21-30.This shows young population are involved in extension services.
4. Extension agents with higher income use ICT devices to enhance their efficiency in information dissemination

5.3 Conclusion

The study assessed the perception of use of ICT among agricultural extension agents in Zamfarastate, Nigeria in the dissemination of agricultural information and knowledge to farmers. It was concluded that mobile phones, radio and television were

ICT devices mostly used by extension agents in Zamfara State. The study also concluded thatannual income, education andworking experience were valuable socio-economic characteristics that significantly influenced the level of use of ICT devices for extension communication services among extension agents in Zamfara State, Nigeria.

5.4 Recommendations

Based on the findings of the study the following recommendations were made:

1. Concerned individuals or stakeholders such as non-governmental organizations and corporate bodies related to agriculture such as International Fund for Agricultural Development (IFAD) should attempt to address the socio-economic factors (income levels, household size, education and working experience) influencing the use of ICT among extension agents in ZamfaraState.
2. The governmentof Zamfarastate should intensify a periodic review of the use of ICT in the extension service delivery so as to identify which particular purpose at a given period of time.
3. Efforts should be made by all tiers of Government to enhance the income status of agricultural extension agents.This can be achieved by increasing their salary and allowances.

5.5 Suggestions for Further Studies

1. Evaluating the educational needs of village extension workers on sustainable agriculture in Zamfara State, Nigeria.
2. Communication for development as a strategy to enhance agricultural extension performance in Zamfara State, Nigeria.

3. Influence of mobile phones on the accessibility of fertilizers among cereal farmers in North – West Zone, Nigeria.
4. Agricultural information needs of small holder farmer on small ruminant production inZamfaraState, Nigeria.

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APPENDIX I

LETTER OF INTRODUCTION

DEPARTMENT OF VOCATIONAL & TECHNICAL EDUCATION
AHMADU BELLO UNIVERSITY, ZARIA NIGERIA
FACULTY OF EDUCATION

Telephone: 069-51755, 50692
Vice Chancellor: Professor. Abdullahi Mustapha B.Sc. (Hons) Pharm(ABU), Ph.D (London) FPSN
Head of Department : Professor A.A Udoh B.Ed. (Hons) Nsukka M.Ed. & Ph.D Bus Edu. (ABU)

Your Ref: _____

Our Ref: _____

4th February, 2015

Date: _____

Letter of Introduction

NASIR ABDULMUMINI KURA – M.Sc. EDUC/3122/2011-12

This is to certify that the above mentioned name is a Postgraduate student (M.Sc Agric Education) in the Department of Vocational and Technical Education, Ahmadu Bello University, Zaria carrying out a research topic: Influence of Socio-Economic Factors on the Use of Information Communication Technology among Agricultural Extension Agents in Zamfara State, Nigeria.

Please kindly give him every assistance he may require.

Professor A.A. Udoh
HEAD OF DEPARTMENT

APPENDIX II

QUESTIONNAIRE FOR EXTENSION AGENTS

Department of Vocational and Technical Education
Faculty of Education,
Ahmadu Bello University, Zaria.

Dear Respondents,

The Researcher is a Master's Degree Student Conducting a Research Study Titled Assessment of Perception of Use ofInformation Communication Technologies among Agricultural Extension Agents in Zamfara State, Nigeria. The Researcher is craving your indulgence to respond to the questions contained in the questionnaire objectively as possible. All information collected be would treated with an absolute confidentiality.

Thanks.

NasirAbdulmumini KURA
P15EDVE8061

APPENDIX III – QUESTIONNAIRE

SECTION A. Bio-Data of the Respondents

Kindly tick (√) as appropriate

1. Gender Male ( ) Female ( )
2. Age in years a. ≤ 30 ( ) b. 31 – 40 ( ), c. 41 – 50 ( ) d. Above 50
3. Household size a. 1-5 ( ) b. 6- 10 ( ) c. 11 – 15 ( ) d 16 – 20 ( )
4. Educational Qualification (a) secondary certificate ( ) (b) ND/NCE ( )(c) HND/BSc ( ) (d) Others ( )
5. Years of working Experience in years (a) 1-6 ( ) (b) 7-12 ( ) (c) 13-18 ( ) (d) 19 and above ( )
6. Annual Income in Naira (a) ≤ 200,000 ( ) (b) 201,000-400,000 ( ) (c) 401,000-600,000 ( ) (d) 601,000-800,000 ( ) e. 801,000 and above.

Research Question 1

What are theICT devices available for use by agricultural extension agents in Zamfarastate, Nigeria?

S/N	ICT Devices	Available	Not Available
7.	Radio		
8.	Television		
9.	Mobile phones		
10.	Overhead projector		
11.	Computers		
12.	Internet Facilities		
13.	Cassette tape recorder		
14.	Mobile cinema		

Research Question 2

What is the perceptionlevel of use of ICT devices among agricultural extension agents in Zamfara state, Nigeria?

S/N		Very Often	Often	Rarely Used	Not Used
15.	I used radio to disseminate valuable agricultural information to farmers				
16.	I used radio to broadcast latest market information to farmers				
17.	I used television to show the farmers how to perform some farming practices				
18.	I used television for result demonstration of an established agricultural fact				
19.	I used mobile phones to communicate to the farmers available market for the sale of crop and livestock produce as well as farm input				
20.	I used mobile farms to inform farmers available sources of farm credit				
21.	I used overhead projectors to show how series of conventional tillage operations are performed				

22.	I used overhead projectors to demonstrate to farmers methods of fertilizer application				
23.	I used computer to retrieve and store important agricultural information				
24.	I used computer to print basic agricultural knowledge and information				
25.	I used internet to access latest agricultural information				
26.	I used internet to access latest technologies in agriculture				
27.	I used tape recorders to transmit recorded massage to farmers				
28.	I used tape recorders for those farmer who could not attend regular agricultural extension contacts				
29.	I used mobile cinema to educate and enlighten farmers on new farm innovation				

Research Question 3

What is the extent to which socio-economic characteristics ofagricultural extension agents influence the use of ICT in ZamfaraState Nigeria?

S/N		SA	A	DA	SD
30	Higher education improves the ability to handle information with ICT devices				
31	The more educated an extension agent is, the more likely he is to use ICT devices.				
32	The age of an extension agent influence the use of ICT in extension services.				
33	Large household size of an extension agent influence use of ICT in extension among the extension agents.				
34	Income level of an extension agent is to enable the use of ICT devices.				
35	Many years of working experience affect the use of ICT among the extension agents				

KEY
SA Strongly Agreed
A Agreed
DA Disagreed
SD Strongly Disagreed