FACTORS INFLUENCING USAGE OF INFORMATION AND COMMUNICATION TECHNOLOGIES AMONG VILLAGE EXTENSION AGENTS IN THREE SELECTED STATES OF NORTH - WEST, NIGERIA

BY

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AUGUST, 2011

DECLARATION

I declare that this dissertation is entirely the result of my research and no part of it has been submitted elsewhere before this. All original ideas used have been duly acknowledged.

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CERTIFICATION

We certify that this work entitled: **"Factors Influencing Usage of Information and Communication Technologies Among Village Extension Agents in Three Selected States of North-West, Nigeria"** by **Fadiji, Taiye Oduntan** has met the requirements for the award of Doctor of Philosophy (Ph.D.) degree in Agricultural Extension and Rural Sociology in the Department of Agricultural Economics and Rural Sociology, Faculty of Agriculture, Ahmadu Bello University, Zaria, Nigeria. It has been approved for its knowledge and literary contributions.

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DEDICATION

I dedicate this work to:

My wife, **Mrs. Modupe Magdalene FADIJI** who has been my partner in progress and has made all necessary sacrifices and given me deserved encouragement to facilitate my completion of this project; and our children, **Joshua, Joseph, Joan and Joy Fadiji** (a.k.a. *the Js*), who have been a combined instrument of challenge to me in undertaking this work.

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My prayer is: "May God reward you all for contributing to my life's progress and achievement through this work. Amen".

ABSTRACT

This study investigated the factors that influenced the usage of Information and Communication Technologies (ICTs) among Village Extension Agents (VEAs) in Kaduna, Kano and Kebbi States, Nigeria. The specific objectives of the study were to: (1) describe the socio-economic characteristics and Perceptions of VEAs; (2) determine the level of awareness and the accessibility of ICTs by VEAs; (3) examine the extent of usage of ICTs by VEAs in their work; (4) determine the VEAs' characteristics influencing extent of usage of ICTs; (5) determine the effects of VEAs' usage of ICTs on their work, and ; (6) identify problems encountered by VEAs in using ICTs. Two hundred and four (204) respondents were sampled from a total of 1,018 VEAs through the use of both purposive and random sampling techniques, in the study area. Data were analysed using Statistical Packages for Social Science (SPSS). The findings revealed that 80% of the respondents were between 30 - 49 years of age, 89% were males, and 11% were females, about 79% were married; and 83% were from households of 10 or less members. Considerable proportion (44%) of them had Higher National Diploma (HND) qualification, 34% had Ordinary National Diploma (OND) and 51% had 19 or more years of working experience. Most (48%) of the respondents had income range of ₦301,000.00 – 400,999.00. Their level of awareness was high on: radio (99%), Cell phones (97%) and television (93%), and low on Fax (32%), Personal Digital Assistants (PDAs) (31%) and land-line phones (54%). The respondents' levels of accessibility to ICT components were as follows: radio (98%), cell phones (96%), television set (85%), cassette recorder (78%), compact disk (CD)/Digital Video Disk (DVD) players (72%), Video Home System (VHS) players (60%), and camera (52%). Results of weighted mean of ICTs used to a great extent were: GSM phones (3.65), Radio (3.38), Cassette recorder (2.66) and Television set (2.65). Results of correlation matrix indicate that significant association exist on: Access to ICT and ICT usage (0.320**) at 0.01 level, Perceptions on Government Policy and ICT usage (0.157*) and Perception on Customs/ tradition and ICT usage (0.141*) at 0.05 level. Also, results of Multiple Linear Regression analysis revealed that usage of ICT was statistically and positively significant on: income (0.039*), Sex (0.007**), Accessibility to ICT (0.000***) and Perception on custom/tradition (0.021*) and Perception on availability of infrastructural Facilities (0.047*). Majority of the respondents agreed that ICT has effect on them in terms of: Time Saving (96%), Cost Saving (88%), More accessibility to ICT (92%), Wider coverage (95%), and More Knowledge (92%). However, the challenges the respondents encountered in using ICT included: poor network/services, unreliable electricity supply, high cost of purchasing it, lack of access, lack of maintenance and inability to operate it. Finally, the following recommendations were made: ICT components should be popularized among VEAs, VEAs' employers should improve socio-economic status and perceptions of VEAs, sustain the effects of ICT on VEAs and ICT providers should make facilities be accessible in rural areas in order to optimize their usage.

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LIST OF ABBREVIATIONS

AIDs	Acquired Immune Deficiency Syndrome
ADPs	Agricultural Development Projects
AEOs	Agricultural Extension Officers
CBOs	Community Based Organizations
CFs	Contact Farmers
CD	Compact Disk
CD-ROM	Compact Disk Read Only Memory
CTA	The ACP-EU Technical Centre for Agricultural and Cooperation
FACU	Federal Agricultural Coordinating Unit
FAO	Food and Agriculture Organization
GSM	General Mobile System
HDI	Human Development Index
HIV	Human Immunodeficiency Virus
HND	Higher National Diploma
ICTs	Information and Communications Technologies
IITA	International Institute of Tropical Agriculture
KADP	Kaduna State Agricultural Development Project
KARDA	Kebbi State Agricultural Development Authority
KATASHI	Kebbi Agricultural Transformation and Self Help Initiative
KNARDA	Kano State Agricultural and Rural Development Authority
LGAs	Local Government Areas
MDGs	Millennium Development Goals
NFDP	National Fadama Development Project
NGOs	Non-Governmental Organizations
NPFS	National Programme for Food Security
OND	Ordinary National Diploma
OLPC	One Laptop Per Child
PDAs	Personal Digital Assistants/Pocket Devices
SMSs	Subject Matter Specialists
TEAL	The Essential Electronic Agricultural Library
T&V	Training and Visits
TV	Television

UN	United Nations
UNDP	United Nations Development Programme
USA	United States of America
VCD	Video Compact Disk
VEAs	Village Extension Agents
VHS	Video Home System

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The world of today is widely acclaimed to be information-driven. In the last one decade, the need to make information and communication channels reachable and available to most, if not all the people of the world, has been a felt concern of development minded people. Consequently, the need for research and development in this context has been widened and intensified among the social scientists.

Nigeria, from all indications, a country in the comity of nations of the world, is also desirous of development. Her over 50 years of independence has been a challenge. Various development plans and programmes have not produced the expected dramatic, positive and progressive change (Idachaba, 2007).

An examination of statistics on the human development status of Nigeria, compared with some other advanced countries, is very imperative. Nigeria, apart from being ranked the 159th position on the Human Development Index (HDI) revealed the positions of countries (Human Development Report, 2006), the country also falls among the Low Human Development categories. Indeed, statistics on other issues like human poverty level, income, sustainable access to water, adult literacy rate, nutritional status, sanitation, infant mortality rate, life expectancy at birth, and maternal mortality ratio, all paint a grim picture of Nigeria compared with other developed countries. Hence, the

challenge before the world and indeed Nigeria, is to alleviate the suffering of the people under poverty in order to emerge from their predicaments.

The apparent and prevalent scourge of poverty, diseases, illiteracy and underdevelopment of many regions and countries of the world has amplified the need to use the mechanism of information and communication as a veritable tool for development. There has been apparent need for growth and development, and the appropriate use and adoption of relevant technologies, including communication mechanisms, has a great role to play in bringing this to realization, especially in the field of agriculture.

There is a drive generally for development worldwide, and in particular, attention is now being focused on the rural areas. All regions, countries, communities, societies and people are yearning for development in all areas of human endeavours namely: housing, transportation, communication, agricultural production, commerce, banking, business and so forth. Hence, the mobilization for development of all peoples is gaining more focus and the trend toward globalization is fast becoming a vogue. The rural areas are not exempted from this aspiration. Indeed, the rural settings are getting more attention. The target of the various Governments of the world, in 2000, when the Millennium Development Goals (MDGs) of the United Nations (UN) were initiated, was to realize reduction by half of the 1990 poverty rate before 2015. The MDGs were mainly set to address eight perceived pressing areas of human endeavours, namely:(i) eradication of extreme poverty and hunger; (ii) achieve Universal Primary Education; (iii) promote

gender equality and empower women; (iv) reduce child mortality; (v) improve maternal health; (vi) combat HIV and AIDS, malaria and other diseases; (vii) ensure environmental sustainability; and (viii) develop a global partnership for development (UNDP, 2006). Specific to the second objective indicated, which focuses on achieving improvement in education, the appropriate usage and application of ICT could impact positively by enhancing the performance of the extension agents.

In the Training and Visit (T & V) approach, introduced by the World Bank is used, for example, the case in Nigeria, the problems and prospects of information delivery, especially on technologies and farm practices, are a cause for concern. A number of problems beset development of agricultural extension service in developing countries. Some of the major notable problems identified by Agbamu (2005) are: inadequacy and instability of funding, poor logistic support for field staff, use of poorly trained personnel, ineffective agricultural Research-Extension Linkages and inefficient/inappropriate agro-technologies for farmers. Others include: disproportionate extension agent to farm family ratio, dilution of extension agents' specific responsibility, lack of clientele participation in programme development, failure of input suppliers to ensure effective and timely distribution to farmers, irregular evaluation of extension programmes and policy, institutional and programme instability of National Agricultural Extension Systems.

It is imperative to stress that the farmers who are largely illiterate need some basic education and exposure in terms of training and extension education. These are usually

obtainable from the extension agents in order to boost their performance and improve their productivity. In the light of this, extension agents, in turn could improve on their communication methods and education through the use of ICT, so that they can become more effective in information delivery to the farmers.

The agricultural sector of Nigeria is a strong springboard for development if it is given adequate attention. In the context of information dissemination and education, skills acquisition of the extension agents and farmers, ICT could be a veritable channel through which development of agriculture in Nigeria could be realized.

1.2 Statement of the Problem

Agricultural production of Nigeria has been largely dependent on the combined efforts of the farmers, most (70%) of whom are resident in rural areas. Ogungbile and Olukosi (1991) outlined the characteristics of resource-poor farmers which are still prevalent today. For example, they are beset with stark poverty, illiteracy, malnourishment, financial inadequacies and low rate of returns on investment. They lack financial resources to practise or engage effectively in agriculture and inflationary tendencies that cripple the output of those who even dare the consequences.

The rural farmers who should be given adequate attention and support in terms of input supply (e.g. fertilizers, seeds, chemicals etc), and indeed information on relevant agricultural technologies are not adequately assisted and informed and could not adopt the up-to-date technologies. Even when informed, they are beset with confusing and late information (Arokoyo, 2003; Arokoyo, 2005 and Adekoya, 2006). Hence, the expected

performance level of the rural farmers has not been realized making the nation's desire to achieve agricultural transformation a mirage. Consequently, the nation's goal in providing food security and self-sufficiency has not been attained.

The extension delivery system generally is faced with myriads of problems. The T&V System of extension, has its limitations, inhibiting factors including; financial constraints, mismanagement of funds, political instability, inconsistency in policy, diversity of structures and organizational set up, multi-facet institutions, deficiency in input supply and manpower shortage. Others include illiteracy of farmers, lack of mobility and training for extension agents (EAs), complex packaging of extension messages, lack of commitment by authorities and lack of continuity in programmes (Ajayi, 1989; Siyanbola and Alao, 1995; and Adegbehin *et al*., 2001).

The World Bank-assisted Agricultural Development Projects (ADPs) were introduced into Nigeria in 1975. By 1985, the system was widely adopted in many states (Idachaba, 2007). It provided a close interaction between the extension agents and farmers. Technologies generated from research are passed from researchers to extension agents for onward transmission to the farmers (the end-users), in that order. Traditionally, however, this method of transmitting the messages (by extension agents to farmers) is usually through person-to-person communication. The method has some associated limitations such as late delivery of information, lack of transportation, inaccessibility, inadequacy of information and mis-representation of the messages.

Thus, the quality and effectiveness of the extension messages by VEAs to the farmers need improvement (Atala, 2008).

The attendant inefficiency associated with the conventional person-to-person information flow mechanism, particularly in extension message delivery, has brought to fore the possibility of application of ICT as a complimentary tool. Arokoyo (2003) observed that, so far, the radio and TV have been the main ICT tools used in agricultural extension delivery in Nigeria.

Indeed, both formal and informal channels of communication (e.g. the print and electronic media, libraries, information centres, and interpersonal communications, etc) are means through which agricultural information are generally sourced and provided (Kiplang'at, 2003). These channels of communication are not fully utilized by the stakeholders in agricultural extension delivery. Therefore, the challenge before the extension message delivery method by Village Extension Agents (VEAs) is to make appropriate use of the available ICT components within the existing ADPs' operations.

This study therefore was tried to delve into investigating factors influencing the usage of ICTs.

Therefore, the pertinent research questions this study addressed were the following;

1. What are the socio-economic characteristics and perceptions of VEAs on ICT?
2. What are the levels of awareness and accessibility on ICT by VEAs?
3. What is the usage level of ICT by VEAs?

4. Are there relationships between the characteristics of VEAs and their influence on usage of ICT ?
5. What are the effects of ICT usage to VEAs?
6. What are the problems encountered by VEAs in using ICT?

1.3 Objectives of the Study

The general objective of the study focuses on the usage of ICT by VEAs.

Specific objectives of this study are to:

1. describe the socio-economic characteristics and perceptions of VEAs;
2. determine the level of awareness of and the accessibility of ICTs by VEAs;
3. examine the extent of usage of ICTs by VEAs for their work;
4. determine the relationships between VEAs' characteristics and their influence on usage of ICTs
5. determine the effects of VEAs' usage of ICTs on their work; and
6. identify problems encountered by VEAs in using ICTs.

1.4 Research hypothesis

The null hypothesis set for this study is stated as follows:

H_0: There is no significant influence of the VEAs' characteristics on ICT usage.

1.5 Justification of the Study

This study has found its justification on a number of reasons. These are outlined as follows:

1. Information generated from the study would be of immense value to policy planners in the area of planning. It is essentially fundamental that policy issues related to the use and application of ICT will be made available to the people for public knowledge.
2. Various stakeholders in agricultural extension would derive benefits from the findings of this study. For example, the extension agents would know their status on ICT usage, the farmers would be able identify the ICTs they can use for their benefits, the researchers and research institutes would be able to identify research areas to explore, the educational systems would set targets for training and curriculum design, ICT providers would know their ICT users and areas for marketing potentials, and finally, donor agencies (e.g. Non-governmental Organizations (NGOs), Community Based Organizations (CBOs), would be able to get those areas where they could make intervention in terms of ICT usage.
3. The need for a study to be premised on the theory of Social Change with particular reference to ICT as a basis for development is illustrated through this study. Consequently, this study derived its model based on the well-proved theory of social change. The study developed a model that shows relationship between ICT usage and those factors responsible for them.
4. There is the general notion that Village Extension Agents (VEAs) are rural workers by virtue of their location, working places and activities.

Generally, they are regarded as people not conversant to issues connected with high technology like the ICT devices. Therefore, the study attempted to unveil the status of VEAs with particular respect to ICT usage in the rural enclaves of agricultural setting.

5. Even though a lot of information on ICT is available in the literature, and internet, there is still glaring lack of access to them. The data generated through this study would be given analysis using various statistics tools like descriptive and regression and correlation. In this connection, findings of this study would provide base line reference point for future studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This Chapter presents a review of relevant literature in line with the objectives of this research. The details are presented as follows:

(1) Agricultural Development Projects (ADPs)

(2) Agricultural Development and Extension System in Nigeria

(3) Socio-economic Characteristics of Extension Agents

(4) Perception studies and Extension agents

(5) Communicating for Agricultural Development

(6) Use of Information and Communication Technologies (ICT)

(7) Constraints to Use of ICT

2.2 Agricultural Development Projects (ADPs) in Nigeria

The establishment of Agricultural Development Projects (ADPs) in Nigeria in the 1970s was aimed at boosting agricultural production in order to meet the demand for food by the populace (Shaib *et al.,* 1997, Jibowo, 2005; and Idachaba, 2007). The ADPs then began as a result of bilateral agreement between Nigeria and the World Bank in 1975. This was expected to provide extension service that would be adequate for the apparent need of the people.

The first generation ADPs began as an enclave projects which were operational in only few Local Government Areas in three states. These were; Funtua ADP, Kaduna

State (1975), Gusau ADP, Sokoto State (1975), and Gombe ADP, Bauchi State (1975). Others soon followed, namely; Ayangba ADP, Benue State (1978), Lafia ADP, Plateau State (1979), Bida ADP, Niger State (1980), Ilorin ADP, Kwara State (1980), Oyo North ADP, Oyo State (1981) and Ekiti-Akoko ADP, Ondo (1982). With the success stories of these projects, it soon became a State-wide establishment and a multi-stage phenomenon, and by 1991, the existing ADPs in Nigeria were about 28 including one for the Federal Capital Territory (Idachaba, 2007).

2.2.1 Kaduna State ADP

Kaduna State lies between Latitudes 11^0 32' and 09^0 02' North of the Equator, and Longitudes 08^0 30' and 06' E of the Prime Meridian. The State is located in the Guinea Savanna ecological region of Nigeria and is among the six states within the North-West Agro-ecological zones. The State' total area coverage is 4.5 million (ha) with a population of 6.067 million (according to 2006 Census Figure). Kaduna State produces the following major crops: sorghum, millet, maize, rice, soybeans, yams, ground nut, cotton, ginger, sugar, gari and tomato. The state also produces animals including; cattle, goats, sheep, pigs, rabbits and poultry.

The Kaduna State Agricultural Development Project (KADP) was established as an off-shoot of the former Funtua Agricultural Development Project (1975 -1980). By July 1985 the Project had become loan effective and operational and in October, 1987, it was bifurcated into Kaduna State and Katsina State ADPs, respectively (KADP, 1995). The main objective of KADP was to increase food production, farm incomes and living

standard of the rural populace in the state. To achieve this objective, the KADP provides the following services:

1. Rural infrastructural facilities such as feeder roads, water supply, inputs distribution, and
2. Dissemination of Improved agricultural technologies to about 606,000 farming families through extension services.
3. Training of staff and others with particular attention to agricultural extension (Kaduna State Agricultural Development Project - KADP (2010).

There are four ADP zones in the State. These are: Birnin Gwari, Samaru Kataf, Soba and Lere serving the 23 Local Government Areas existing in the State (Appendix 5).

2.2.2 Kano State ADP

Kano State is the most populous state in Nigeria. The 2006 National Census puts the population of the Kano State at 9.384 million, the highest in the country. The state is situated between latitude 12^{o} 33' N, and longitude 9^{o} 25' E with total land area of 20,400km^2. The state is blessed with a hard working, industrious and enterprising populace, large arable land and a conducive climate for agricultural production. The southern part of the state lies within the northern guinea savannah, while the northern part falls in the sudan zone with some part of zone II coming under the Sahel zone. Rainfall pattern is unimodal and ranges from 800-1000mm per annum with a mean of

834mm. The number of raining days decreases from the south (110 days) to the north (90 days).

The Kano State Agricultural and Rural Development Authority (KNARDA) was established in the 1970s with a World Bank loan to strengthen the state's agricultural and extension service (Diagnostic Survey of Agricultural Resources in Kano State, 2008).

KNARDA is extensively involved in the following programmes and activities: Radio and Television (Media) programme, OFAR Trials for wet and dry seasons, input procurement and distribution, seed processing, Small-holder diary project, Emergency Initiative to Boost Rice Production(ERI), Fadama III project and Nigeria Fertilizer Voucher Program (KNARDA, 2010). The authority has also designed an agricultural development road map in order to boost agricultural production in the state. The KNARDA has three operational zones covering the 44 Local Government Areas (LGAs) of the State (Appendix 6).

2.2.3 Kebbi State ADP

Kebbi State was carved out of the erstwhile Sokoto State in 1991, and is situated (10^0 06' - 13^0 17' N, 3^0 30' 6^0 02' E) in the extreme north-west corner of Nigeria. It is one of the several northern Nigerian states in the vast Semi-arid Sudano-Sahelian ecological zone which experiences serious moisture deficiency for greater part of the year (Singh, 1998). Kebbi State has a population of 3.239 million (2006 Census Figure). The State produces the following major crops: sorghum, millet, maize, rice, soybeans,

groundnut, cotton and tomato. As elsewhere in this zone, the climate in Kebbi State consists of a long (October – May) dry and a short (June – September) raining season. The dry season includes a cold dry spell (November – February) popularly known as the harmattan (dusty north-east wind originating from the Saharan desert) period, and a hot dry spell (March – May).

The annual rainfall roughly ranging from 400 to 700mm, increases both in quantity and intensity within the Kebbi State as one moves from Zone I (Arugungu) in the north through Zone II (Bunza) in the middle to Zone III (Zuru) in the east and Zone IV (Yauri) in the south (Appendix 4).

Kebbi State Agricultural Development Authority (KARDA) is charged with the purpose of carrying out integrated development of agriculture in the State. (KARDP (2010). It has the responsibility of increasing agricultural productivity in the State mainly through the provision of necessary agricultural inputs and extension services, some level of infrastructural development and adaptive researches in order to ensure income and food security of the small holder farming families. In order to facilitate the achievements of this major goal, the ADP is divided into 4 zones that cover the two agro-ecological zones of Sahel savanna (SS) and Northern Guinea Savanna (NGS). Kebbi Agricultural and Rural Development Authority (KARDA), with its headquarters at Birnin Kebbi, has four Zonal Offices at Arugungu, Bunza, Yauri and Zuru which provide agricultural support to the respective local governments (Appendix 4).

KARDA carries out its mandates through the following sub-programmes:

a) National Agricultural Technology Support Project (NATSP)

b) National Fadama Development Project (NFDP)

c) National Programme for Food Security (NPFS)

d) KARDA also implements special intervention programmes such as:

- Kebbi Agricultural Transformation and Self Help Initiative (KATASHI)
- Cassava Production Project (CPP)
- Sasame Production
- NAPEP Intervention in Agricultural Sector
- Doubling Maize Production
- Cotton Production Rehabilitation Project, and
- Presidential Initiative on Rice Production

In carrying out its mandates, KARDA is constantly linking with research institutions and other stake-holders such as IAR/ABU, Zaria, IITA, Sasakawa Global 2000, NCRI and IFAD(KARDA, 2008).

2.3 Agricultural Development and Extension System in Nigeria

Extension, in a broad sense, may be defined as: the act of extending or a service or system which extends, the educational advantages of an institution to persons with the expectation of change for good. Extension, in all its ramifications, takes education and information to the people. Agricultural extension therefore has been defined by Maunder

(1973) as: “A service or system which assists farm people, through educational procedures, in improving farming methods and techniques, increasing production, efficiency and income, bettering their levels of living, lifting the social and educational standards of rural life”. The basic concept on the broader function of extension work is to help people to solve their own problems through the scientific knowledge with the aim of improving their agricultural methods, their incomes and standard of living.

Benor and Baxter (1984) have outlined explicitly the responsibilities of extension workers in an organized environment. They classified extension workers’ duties into two basic categories; one to farmers and the other to their supervisors. According to them, in a nutshell, an extension worker prepares for field visit to his contact farmers, teaches them recommended practices and encourages them to adopt available technologies. They also liaise with their supervisors (SMSs and AEOs) by attending trainings and meetings aimed at equipping them and getting feedback on their extension activities. It is an avenue for extension agents to provide feedback from the farmers’ fields to other extension staff, research and input organizations. During the meetings and trainings, the extension agents report back on the progress they make on the farmers’ fields, the problems they encounter and seek to proffer solution to them. Issues related to farmers’ reaction, condition of local markets and availability of recommended farm inputs are discussed.

Extension activities through professionalism, via Training and Visit (T&V) system, as illustrated by Benor and Baxter (1984), is noted among a number of other

available means of organizing extension services along effective and productive lines. Its reliability and adaptability to a wide range of agricultural and administrative pedestals, especially in the developing countries, is well proven. Through it, for example, the Village Extension Agent (VEA) works with Contact Farmers (CFs) on agriculture with special attention paid to the relevant and useful practices which are subsequently passed on to other farmers. Thus, farmers are invariably used to disseminate extension information from one to another.

From the foregoing, it is imperative that the manner in which agricultural information are passed from researchers to extension staff and farmers is properly organized and the channel carefully chosen (Adebayo and Okuneye (2005). However, according to Ahmed *et al.,* (2007), it is imperative that funding of agricultural extension in Nigeria should be improved upon in order to experience appreciable progress and development.

2.4 Socio-Economic Characteristics of Extension Agents

The use of ICT has been found to be influenced by a number of human and environmental factors. Information literacy can be attributable to awareness of kinds of information available and the means of locating and getting it. Hence, a connection between awareness, knowledge and literacy level - being human factors influencing ICT usage - could be established. Barraket and Scott (2001) identified, in addition to access,

level of information literacy as a paramount factor on ICT. In a similar vein, Selwyn (2003) agreed that information literacy is a necessary prerequisite to accessing and using of ICT. It is however pertinent to note that generally, other issues connected with determinants of ICT usage include: cost, time, quality of technology, convenience, safety, availability and facilities. The issues and problems related to where extension agents source relevant information on technologies and improved practices for onward delivery to intended farmers have been identified by Fadiji (2000).

Allan *et al.,* (2008) illustrated a framework of factors that play a part in influencing ICT and security technology adoption among Australian SMEs - based on a framework by Rashid and Al-Qirim (2001) as follows:

(a) **Individual Factors:** Chief Executive Officer (CEO's) (Manager's) Innovativeness and Chief Executive Officer (CEO's)/(Manager's) knowledge

(b) **Organizational Factors:** Size, quality of systems, information intensity, specialization and management support

(c) **Environmental Factors:** Competitive pressure, supplier/buyer pressure, public policy and government role; and

(d) **Technological (Innovative) Factors:** Relative advantage, complexity, compatibility, cost and image

Ugbo and Izah (2005) in Otolo (2008) outlined the characteristics of an extension worker as follows: (1) Originality (2) Organizational ability (3) Public speaking (4) Administrative ability, and (5) Public relation. Hence, they further asserted that

communication of information to the intended rural farmers should be well coordinated in order to achieve the desired effective extension service delivery.

In a study on VEAs in Lagos State, Issa (2008) found a significant relationship exist between areas of specialization, years of experience, professional competence, the attitudes and problems, in relation to their job performance. Chikwendu *et al.,*(1996) stressed the importance of extension agents as a source of agricultural information dissemination to farmers. Similarly, this finding agrees with Okunade *et al*., (1999), in a study of women farmers, which found extension agents to be in majority (95%) as source of dissemination of agricultural technologies.

2.5 Perception Studies and use of ICT

Perception has been given various definitions, concepts and theoretical expositions. According to Free Online Dictionary (Thesaurus and Encyclopedia) – accessed online in June, 2010) at: http://www.Freeonlinedictionary.com/), perception has been defined in four ways namely: (1) the process, act or faculty of perceiving, (2) the effect of product of perceiving,

In Psychology, it is: (a) Recognition and interpretation of sensory stimulus based chiefly on memory, (b) The neurological process by which recognition and interpretation are effected, and

It is also defined as (a) Insight, intuition or knowledge gained by perceiving, and (b) The capacity for such insight.

Wikipedia (2010b), (accessed online in June, 2010 at: http://en.wikipedia.com/) puts Self-perception theory (SPT) as an account of attitude change developed by psychologist Daryl Bem. The theory posits that people develop their attitudes by observation and

making conclusion on the causative attitudes. Also, the theory suggests that a person induces attitudes without accessing internal cognition and mood condition. Little (1999)'s literary contribution to the theory of perception delved into understanding perception, the fundamental basis of perception; the concept of immediate perception and; the psychological aspects of perception in universal context. He however, attempted to build a bridge of connection between objects and events in the understanding perception of reality. Hoffman (2009) and Hoffman (2010) , in another dimension, argued that our perceptions constitute a *specie-specific user interface* that guides behaviour in a *niche*". He drew his assertion on Interface Theory of Perception (ITP), stressing a kind of human perception based on framework motivated by evolution, to guide research in object categorization. He stated that a goal of perception is to estimate true properties of the world.

In a similar work, according to Dilworth (2005), writing on the Theory of Perception, stated that "a basic fact that all theories of perception must account for is that perception enables us to acquire information about worldly objects and their properties". His work on The Reflexive Theory of Perception, argued for a broadly behavioral theory of perception, stated that perception of an object or property X by an organism Z consists in Z being caused by X to acquire some disposition D toward X itself. Hence, this explains perception intentionally and correct versus incorrect, successful versus unsuccessful, perception in a plausible evolutionary framework.

2.5.1 The Application of Perception in Studies

In application of perception in studies, it has been found to be useful in making findings and drawing cogent conclusions, including areas such as ICT.

Atala (1986) examined the role of the extension agent in Kaduna State, Nigeria in terms of role perception, role performance, and role consensus. Specific to role perception, he examined congruency between role perception and role performance that is, whether the perceived or not perceived roles were performed or not performed.

Adesope and Matthew-Njoku (2005) reported that 85% of the respondents had access to computers while 15% did not have access. The study highlighted perception statements showing agreed mean of the respondents as follows:

- Information technology (IT) makes information from other parts of the world easily accessible (3.34)
- Information technology is a welcome idea (3.57)
- There are still more benefits related to agriculture yet untapped from IT (3.15)
- The agriculture industry has benefited positively from information technology (3.15)
- IT makes linkages functions of agricultural research more reliable (3.44)
- The awareness of about improved agricultural technologies will increase with the coming of IT (3.55)
- Communication of agricultural ideas will continue to be worthy through Utilization of IT (3.76).

Possession of requisite skills and knowledge to use a technology have been found to be factors related to individual experience of and attitudes towards using technologies (Osagie, 2008). A study by Cole (1998) found evidence of a variety of attitudes toward Information Technology by library users, and even though their way of display of positive attitude toward the use of computers, lack of regular access to ICT facilities, will not make them get up-to-date information on development in technology.

Leeuwis and van den Ban (2004) attempted to establish a link between perception, knowledge and information as they declared that Perceptions or meanings inform us about a particular state of affairs, and thus constitute information. They asserted that, contrary to notions like perception and meaning, the term information is, in every day language, often associated with knowledge that has been captured and stored in a physical (or nowadays electronic) form such as a book, leaflet, file, newspaper, picture, sound, website, etc.

According to Sparrow (1999), the perception of risk involved in adopting ICT as a major issue to managers and owner-operators of Small to Medium sized Enterprises (SMEs); disruption to the business processes and relative position in the market are factors that many administrators have considered to be too great. Earlier studies by Violato *et al.,* (1989) and Koohang (1989) had found teacher's attitudes and perceptions have not been emphasized in the implementation of technology into the classroom, even though studies stated that teachers' attitudes, as well as knowledge and skills in using computers, are major factors affecting their initial acceptance of computer technology

and their future behaviour regarding computer usage. In a similar report, another study indicated that teachers' attitudes toward computers affect their instructional use of computers and likelihood of profiting from training. However, much later, Yuen *et al.,* (2008), in an exploratory study of teachers' perceptions, in factors predicting impact of ICT-Use on students, found the following:

- Teacher's perception on student-practice orientation was the strongest predictor of student-impact than other factors;
- The direct effects of teachers-practice orientation, student-practice orientation and pedagogical ICT competence on student-impact were positive, and;
- The pedagogical ICT competence had direct as well as indirect effects on student-impact.

Similarly, Yahaya *et al.,* (2006) discovered that electronic media are effective in all aspects of rural life. The study further agreed that there is a significant relationship between attitude of rural dwellers and their perception of effectiveness of electronic media. The role of perception in a study on agricultural science teachers in Young Farmers' Club Programme has been reported by Ajayi (1989). In a study that examined relationship between personal characteristics and access to information, Adekoya and Ajayi (2000) found education enhances individual's access to information. Atajeromavwo *et al.,* (2010) on the practitioners' perceptions on the relevance of agricultural and rural development activities and ICT, found out that 91% of the respondents agreed that ICTs can be used easily to connect via network researchers for

easy access to information, 91% agreed that ICTs can facilitate international exchange of ideas for agricultural development and 86% agreed that it can facilitate research-extension institutions linkage for effective agricultural information dissemination. Sofowora (2010) found out that the older adults had indicated some perceived negative effects of GSM phones usage.

2.6 Communication for Agricultural Development

The importance of communication in agricultural extension is of tremendous value. Communicating, especially extension and agricultural information and group levels has its importance and advantages. Communicating, in agricultural terms, entails passing of related agricultural information to and between the stake-holders including farmers, extension agents and agricultural scientists. However, agricultural extension communication, in the context of development, is specifically targeted toward improving the livelihoods of the participants (the farmers and extension staff) through the process of exchanging agricultural information between themselves and others. Hence, the adoption and/or non-adoption of recommended technologies and packages could be attributed to the effectiveness of the communication methods, channels and techniques. The limitations and constraints found in the traditional and formal communication channels have made ICT application more relevant. Consequently, because of its wide application in scope and coverage, a more satisfactory and useful mechanism for innovation in communication in agricultural context is desirable (Omotayo, 2005). This has thus brought about the introduction of ICT as an innovation in agricultural development.

For instance, Leeuwis and van den Ban (2004) documented an extensive work on communication for innovation looking at the changing perspectives and the organizational and inter-organizational issues involved. Specific to the media methods, and process management, the work outlined issues related to farm management, pre-

defined issues, exploration and training. Their work went further to examine methods related to information provision with discussion on written and computer-based search and access facilities as well as information-needs assessment.

Rogers and Shoemaker (1972) defined communication as the process by which messages are transferred from a source to a receiver. The authors observed that communication is part of social change process. Contreras (1980) examined the impact of communication on modernity thus generating a thesis that communication has not played as important role in rural development in developing countries because of a series of structural constraints under which it has operated and, of course, will probably continue to operate.

The onus of responsibility is squarely placed on the shoulders of the engineers and scientists to work toward ensuring broad application of it in all ramifications and for all sectors of human economy and development; government, education, agriculture, business, health, communication, transportation, services, aviation, art, tourism, banking and commerce – all of which are linked directly or indirectly to the rural areas and their activities.

According to Van dan Ban and Hawkins (1993), diffusion process (i.e. the stages between when the farmer first hears about favourable innovations and the time he adopts them), and it takes the following stages namely: (1) Awareness (2) Interest or information (3) Evaluation or application (4) Trial, and (5) Adoption.

Otolo (2008) found out that the extension agents constituted (38.42%) as their source of information on innovations and development in agricultural sector, followed by the media (34.21%). In addition, the findings further showed 88.9% positive effect of Communication on rural farms to the rural farmers.

Kosakowski (2009), available at: www.ericdigests.org/ accessed in February, 2009) noted the following being the factors observed in successful technology-rich schools:

- ✓ Evidence of a detailed technology plan.
- ✓ Teacher training and continuing education.
- ✓ Support from administration.
- ✓ Support from the community e.g. Parents, businesses, and community members
- ✓ Support from government.
- ✓ Adequate funding and appropriate policy making can help to assure that technology is accessible to all schools on an equal basis.

In summary, he concluded that these factors suggest that for technology to succeed, like any educational tool, it cannot exist in isolation, but must be made an integral part of the entire instructional process. The internet, (technically known as the World Wide Web (www), is another technology which provides immense mass usage. In this direction, Mojaye (2006) examined the role of the internet in some selected Nigerian newspapers and their patterns and nature of its utilization in terms of: information posted on their websites, number of internet-connected computers and frequency of sourcing stories from the internet. Other areas they examined were; reporters with e-mails and those that file-in stories through it, and above all, the benefits accruable from using internet facilities.

However, some of the factors identified being responsible for deficient communication in agriculture include: lack of adequate trained agents, ignorance of the participants/parties involved, cultural impediments, organizational problems, deficient communication strategies and lack of required input and resources. Others include; language barriers, indifference, differing perspectives, illiteracy, prejudices, etc (Umar, 2005 and Ogunbameru, 2006).

2.7 Use of Information and Communication Technologies (ICTs)

Information and Communication Technologies (ICTs or ICT) is a relatively new means of disseminating information among people worldwide. ICTs have been defined as and it comprises of processing and transmission of information by electronic means such as radio, television, telephones (fixed and mobile), computers, Pocket PCs and the internet (CTA, 2003).

Generally, the various available ICT components/devices include the following: Radio, Television, Multi-media systems (VCDs, DVDs, VHS, Over-head projectors), Telephones (Land-lines and Mobile phones), Internet (E-mailing, Web-browsing, telephoning), Computers and Personal Digital Assistants (PDAs). Others include: Media Players (MP 2, 3 & 4), Geographic Information System (GIS), Geographic Position System (GPS), Cable Satellite, online Newspapers, e-Books, journals, tablet systems and smart phones, ipods and ipads.

This involves the use of the above-listed media to exchange information with the stakeholders such as: farmers, extension agents, researchers, administrators, policy-

planners, marketers, cooperatives, agro-processors, Non-Governmental organizations (NGOs). The world today is still confronted with the problems of illiteracy and ignorance coupled with inadequate flow of information. The importance of information on research and development cannot be over-emphasized. Indeed, the usefulness of information and credibility of information source have been found to be positively and significantly related to adoption of improved cassava production technologies (Matthews-Njoku, 2003). Oninowu (1996) built an historical background around the use of communication support facilitates by rural and agricultural development organizations to promote the uptake of improved technologies or messages within farming communities. This was exemplified in the Nigerian situation with State ADP radio programme producers given trainings in 1990-1991 and 1993 by their Federal Agricultural Coordinating Unit (FACU) – although now defunct.

Wikipedia (2010a) stated that ICT, apart from being user-friendly, easy to access, cost effective and well-protected from unauthorized accesses, also serves the following purposes: Record text, drawings, photographs, audio, video, process descriptions, and other information in digital formats; produce exact duplicates of such information at significantly lower cost; transfer information and knowledge rapidly over large distances through communications networks; develop standardized algorithms to large quantities of information relatively rapidly; and achieve greater interactivity in communicating, evaluating, producing and sharing useful information and knowledge.

Wikipedia (2010a) further described ICT being consisted mainly of three main technologies namely: Computer Technology, Communication Technology and Information Management Technology. Generally, there are many information and communication technologies (ICTs) through which data and information could be stored, transmitted, retrieved and analysed.

A host of ICT devices are available worldwide, however, for the purpose of this research, the following devices for information and communication were selected, namely: Radio, internet (and e-mailing), Pocket Devices (PDAs), Land line phones, GSM/Cell phones, Television (TV), Fax, Overhead projectors, and Cinema. Others include: Camera, VHS Video Players, VCD/DVD Video players, Computers and Audio Tape Cassette Recorders.

Wikipedia (2010a) further discussed the application of ICT in agriculture becoming increasingly important and stated that: E-Agriculture is an emerging field focusing on the enhancement of agricultural and rural development through improved information and communication processes. It stated further that more specifically, e-Agriculture involves the conceptualization, design, development, evaluation and application of innovative ways to use information and communication technologies (ICT) in the rural domain, with a primary focus on agriculture. E-Agriculture is a relatively new term and we fully expect its scope to change and evolve as our understanding of the area grows, it concluded.

The intrinsic role of ICTs toward adoption of technologies in agriculture has been stressed by Warren (2001). The trend toward

e-agriculture is fast gathering momentum. There is virtually no sector where ICTs cannot be used: Agriculture, education, health, transportation communication, Science and Technology (S&T), Security, Legal and Policy, e-commerce, e-economy and e-Government (FAO and ITU (2003) and Butcher, 2004). FAO (1993) had outlined the potentials of micro-computer in giving support to agricultural extension. The role of ICTs toward securing improvement of the resource-poor farmers through a synergy of access to telecommunications and socio-economic development has been emphasized (Kiplang'at, 2003). The contemporary agricultural practices can yield significant result and attain sustainability through effective use of information exchange mechanisms like ICTs. The important role of ICTs has been well documented illustrating its importance to both advanced and developing countries like Chile, Peru, South Africa, India, Mexico, Bangladesh and Uganda, particularly in terms of information exchange in rural communities (Munyua, 2000).

Information, no doubt, could be an effective instrument for development, especially in the rural areas and for the benefit of the poor. Specifically, extension information can provide a tremendous impetus to rural farmers, and indeed to the generality of rural populace. Zijp (1994) identified Information and Communication Technologies (ICTs) as very useful to support the improvement of the apparent inadequate extension and education services particularly for the development of rural areas. The diversity of livelihood strategies among small-scale family farms and the importance of non-farm income has magnified the need to develop differentiated rural development strategies (Berdegue and Escobar, 2001).

The importance of ICTs to human development cannot be over-emphasized. ICTs could be used as a strong linkage for development between the rural and urban areas. By so doing, the digital divide would be closed up eventually and the general people of the world would be better of than before. It would however be a big error if the use of ICTs is confined solely to a limited region, area or people.

For instance, when a comparison is made on internet usage in Africa compared with the wide and progressive usage of cell phones, it is still far behind. Asia, Europe and North America dominate the internet users' world while Africa, Middle East and Australia/Oceanic region are at the bottom of the ladder (Appendix 2). In Sub-Saharan Africa, it has been estimated, that by 2001, only one in one hundred owned a personal computer (Painting and Wesseler (2004). Specific to internet use, in 2000, only 0.4% of total population of Africa used the internet compared to 53.3% in the USA. Therefore, there still exists the wide gap in information flow between the developed and underdeveloped countries, not only in the urban areas but more pronounced in the rural settings. Introduction of tele-centres or phone shops has been found to provide tremendous success in places like Burkina Faso, Senegal, Mali, and Uganda (Painting and Wesseler, 2004) even though largely in the urban areas. Their extension in the rural areas, no doubt, would provide an impetus of opportunities and improvement to larger populations.

A Canadian research institution, Institute for Development Research (IDRC, 2003) report gave a comprehensive assessment and study on the use of ICTs in Kenya, Senegal, South Africa and Uganda drawing from cases of projects executed in some of their

communities. An illustration of phenomenal growth of cell phone compare to fixed lines is found in South Africa. For example, as estimated, the state-owned Telkom Limited which provided fixed telephone lines of about 5.86 million (in 2001) while the cellular phone companies (Vodacom and MTN) had a combined subscribers of 9 million. Concerted efforts are being geared toward reaching more of the underprivileged rural areas across the country.

Ekong (2003) opined that there were generally inadequate communication facilities in Nigeria as people depended often and largely on face-to-face communication even in cities. Interestingly, Nigeria has grown from mere 500,000 lines in 1999 to 35 million lines in tele-density in 2007 (Fanawopo, 2007). There is still more room for growth as the 140 million population of Nigeria (2006 Population Census) deserve the benefits accruable from this infrastructural facility. Specific to Nigeria, some remarkable improvements and policy measures have been made toward making Nigerian telecommunication environment up-to-date.

No doubt, Nigeria is fast becoming a fertile ground for the application, utilization and production of communications facilities, especially ICT, and the trend is in such a pace that is impressive and gives indications for more improvement. It was reported that a US company (Recellular), a specialist company in discarded cell phone is currently providing recycled phones, in Kenya and Nigeria, and sold at one-third or one-half of their original prices and are made available to African farmers to enable them access agricultural information (Spore, 2007). In Appendix 3, Nigeria is 24th (with 40, 395, 000 users) among the top 30 countries using cell phones worldwide **(**Accessed online in

June, 2010: http://infoplease.com/world.html/). This may sound impressive and encouraging. However, when critically compared with leading countries like China 2nd (with 547, 286,000 users) and United States of America - 4th (with 255,000,000 users), Nigeria is still, by and large, lagging behind. The gradual growth rate of cell phone users in Nigeria may however be her remarkable credit.

Chapman and Slaymaker (2002) carried out an extensive review of ICTs stressing its capacity to exceed the physical distance, linking communities and "integrating with wider social and economic networks". Unfortunately, some countries are yet to grapple with the importance of knowledge transfer in spite of the apparent fact that knowledge and capital are strong catalysts for success within the globalization paradigm being promoted (Rivera, 2001). Similarly, Lobo (2007) reported a classical example and success of rural development efforts through communication campaigns in informing and training farmers and diffusion of appropriate technologies in Mozambique through the employment of various available media (radio, television, theatre, posters, brochures, meetings). Another case was reported in the Cambodia Information and Communication Technology for Development (ICT4D) National Education Policy (2005) - accessed online at the website: http://www.comminit.com/ict/ictpolicies/ictpolicies-20.html). This policy document was developed to focus on Cambodia's "Education for All" vision of ensuring all citizens equal access to basic quality education, and to prepare them to participate

actively in Cambodia's reconstruction and integration into the knowledge-based global community. The policy places emphasis on the role of ICT in distance education, the training of professionals, non-formal education, and the quality of education at the upper-secondary and post-secondary levels, in recognition of the importance of ICT skills in a knowledge-based society.

Radio has been found to be an effective means of disseminating agricultural information to farmers. It is widely used as a means of communication - sending and receiving information by people. Similarly, rural farmers in particular in many regions of the world find radio as a veritable source of deriving extension related information. Some studies have shown some significant roles radio has played in sourcing agricultural information (Yazidu, 1973; Voh, 1981; Chikwendu and Onyibe, 1996; Arokoyo, 1998; and Omokhudu, 1999). Also, Chikwendu and Omeneza (1997) have established that disseminating agricultural information in a result-oriented manner could be achieved through the instrumentality of established effective and efficient channels of communication among researchers, extension workers and farmers. In another related study, Omenesa (1997) stated that radio is one of the most important media of transmission of information to the grassroots in Nigeria.

Indeed, some areas of ICT application are receiving good attention in Africa. Radio, for example, is gradually being used more widely in many areas of human

endeavours, especially the rural communities. There is expansion in both fixed lines and mobile networks in recent past with the latter growing in a phenomenal rate in some countries in Africa.

Radio still plays dominant role in both information dissemination and communication in many parts of the world. For example, as shown in Appendix 1, Nigeria was rated 1st in Africa among countries with high level of radio ownership. Mayer's (2008) report on Africa amplified the position that radio is a dominant medium of mass communication and its convergence with other ICT tools like computers, mobile phones and MP3 players. Describing radio as a community source of information, she declared: "an invaluable tool in emergencies and the humanitarian aid context".

Fadiji (2007) discovered in a study, that majority of rural farmers in Nigeria use radio as their source of deriving extension information on daily and weekly basis. Similarly, Murtala *et al.,* (2007) indicated considering preference of farmers' sources of information, the Extension agents (56%) to first position followed by radio (48%). Their findings on the source of information revealed radio as the second (22.22%) after extension agents (46.67%).

Aderinto *et al.,* (2008) found that use of ICTs by extension personnel included the following; 100% used radio; 100% used TV; 58.8% used telephone). On non-usage 83.3% did not use Website; 80.4% did not use CD-ROM; 61.8% did not use internet). Concerning factors on use, their findings revealed the following; (availability of TV and radio (100%), Accessibility of TV and radio (100%); Affordability of TV and radio (100%); Ease of use of TV and radio (100%); Job necessity of telephone (73.5%) in comparison with Availability of

fax (9.8%); Accessibility of website (8.8%); Affordability of fax (7.8%); Ease of use of websites (4.9%) and Job necessity of radio, TV, Fax and newspaper (0%).

Huggins-Rao *et al.,* (2009) reported a demonstration of using radio in combination with other ICTs (like mobile phones and MP3 players) to record useful information and transmit/record radio programmes for broadcast or for playback. Apatanku and Lawal-Adebowale (2009) found the following ICT devices owned and used by some agricultural extension and research organizations namely; Computers, Tele-fax, telephone, websites, E-mail, radio, television, and VCD/VCR thereby laying credence to the importance of these devices. Also, their findings revealed that the Organizations Usage of the device of ICT for agricultural activities (including Computers, CD-ROM, Diskettes and Web-Pages) for documentation and information dissemination; while their programmes were also aired on radio and television (TV). Busken and Webb (2009) have illustrated the remarkable development, throughout Africa, of women involvement and use of ICT components like mobile phones, CD-ROMs and internet. Furthermore, the work exposed some tangible benefits offered to women by ICT utilization, some of which are: increased revenues, better access to information, new career, employment opportunities and protection.

Masianini and Rokotuibau (2009) exemplified a typical ICT usage project involving extension workers and farmers in the Pacific in terms of; ability to produce DVDs, printed guides, radio and TV Programmes in strengthening rural economies. In another report but similar, Mugo and Vermenlen (2011) also stated that ICTs effects has been recorded in Mali through an IICD support to women association by provision of three computers, some

solar panels, two photo–cameras and one video–camera, which permitted the women to present their products on a website. As a result of their usage, coupled with management and marketing tools, had helped women's association for producing and marketing shea butter production levels and improved sales and revenues.

Madukwe (2009) cited from Nigerian perspective how radio and TV Stations, since Nigeria's independence, and mobile phones and internet, more recently, are the ICT components being used to improve livelihoods of Nigerian farmers. Findings of Levbaoje *et al.,* (2005) among earlier studies carried out in Nigeria, looked at the level of preparedness of Field-level Extension workers on the use of some ICTs. Their findings then had shown that most of them (78.2%) did not use e-mail (internet), 76.3% were not computer literate, and only 44% had cell phones.

Zaid's (2008) study specifically centred on the use of Internet for cataloguing and classification in Library, an illustration of the fact that Internet provides great flexibility through which catalogers are enabled to share information about their work as well as administrators and vendors. Chete *et al.,* (2008) findings on operation of electronic e-Government, an assessment of a Government based website, found that majority of the respondents (40%) agreed that phone contact, address contact, publications, link to other sites and data bases would help an ordinary citizen contact a Government agency. Also, 55% of the respondents are of the position that the use of E-mail would help citizens contact Government officials and make use of information on websites.

Mojaye (2006) discovered that a lot of benefits can be derived from internet (world wide web) usage among which are: quick access to information, delivery of news, access to world wide visibility/ readership and quick news posting and advertisement.

According to Danladi *et al.,* (2008), ICT is considered of great importance to mankind and among the notable areas include the following:

- ✓ It is time-saving
- ✓ It increases efficiency
- ✓ It is convenient in processing data
- ✓ It saves energy
- ✓ It helps in developing basic skills, and
- ✓ It helps in the storage and transfer of information

According to Mugo and Vermeulen (2011), ICTs can help to promote agricultural production. Specifically, they stated that ICTs can be used to document what farmers are doing in one region. This information can be shared through CD ROMs, short videos and pictures.

Yekinni and Hussein (2008) examined ICT formats deemed important for official work namely: Radio, TV, cinema, Newspaper, Fax, phone (fixed), mobile phone/GSM, Video, Computers and CD-ROM. Others were: Organization e-mail, Organization Website, Personal e-mail and Personal website. The work further outlined the following findings; 90.9% agreed that ICTs can easily network all researchers for easy access to information; 90.9% agreed that ICT can facilitate international cross-fertilization of ideas for agricultural development; 86.4% agreed that ICT can facilitate research-extension institutions linkage for effective agricultural information dissemination, and; 77.3% agreed that ICT can incorporate feed-forward mechanism into research-extension in order to have end-users' input and reaction.

A lot of studies on the use of ICT has brought into focus the numerous importance attached to the thriving technologies. In a related publication, Atala and Umar (2006), in Nigerian context, examined the extent of use, efficiency and limitations found in General Mobile System (popularly called GSM) as a technology for mass communication. The study focused on the use of GSM by journalists, identified the following problems; poor services, high charges, network problems, and difficulty in interconnectivity. The study however discovered that journalists have been assisted as GSM use has improved their work performance and productivity.

2.8 Constraints to the Use of ICT

There are myriads of problems connected to the use and application of ICT. It is a technological device with inherent sophistication. Furthermore, it is a device undergoing changes from time to time, as the producers/manufacturers try to improve on them. Aderinto *et al.,* (2008) discovered that on some of the constraints associated with ICT include: lack of time, remoteness of station, high access change and low knowledge of use. Danladi *et al.,* (2008) observed a number of problems created in the use of ICT which, among others include: the anti-social sites visitation by the youths on the internet leading to the cultivation of negative attitudes/behaviours; encouragement of crimes and fraudulent activities,; discouragement of corporate learning, discouragement of creativity among teachers, and; shortage/unaffordability of ICT equipment. Zainab *et al.,* (2008) also identified the following problems associated with ICT use: frequent power failure and lack of alternative power supply, lack of basic knowledge of ICT utilization, system difficulties operation, inadequate finance for procurement and maintenance of

ICT facilities (components), and lack of adequate and trained staff to handle ICT facilities.

Akpabio, *et al.,* (2008) identified constraints which include: poor ICT infrastructure development, high cost of broadcast equipment, high charges for radio/television presentations, high cost of access/interconnectivity and electricity/ power problems. Arokoyo (2003) cited the following as constraints to ICT in Nigeria: Poor and erratic funding, poor ICT infrastructural development, high cost of power/electricity, very high cost of telephone services either by landlines or GSM, Limited access to computer and the Internet. Others were: Policy inconsistencies by government in both the telecommunication and agricultural sectors, high-level of rural poverty, high-level of illiteracy among farmers and computer illiteracy among scientists and extensionists, limited access to worldwide databases on CD-ROMs, the limited coverage by the near absence of rural radio/exorbitant cost for farm broadcasting. Lal (2007) stated that one of the major factors inhibiting ICT diffusion and intensive utilization is poor physical infrastructure represented by inadequate and interrupted electricity supply and communication connectivity infrastructure.

In conclusion, the foregoing literature review has extensively captured some the relevant subject areas and objectives set for the study especially in the context of: Agricultural Development Projects (ADPs), Agricultural Development and Extension System in Nigeria, Socio-economic Characteristics of Extension agents, Perception studies,

Communicating for Agricultural Development, the Use of Information and Communication Technologies (ICTs) and constraints to its use.

CHAPTER THREE

THEORETICAL MODEL

3.1 Introduction

Academic research is normally premised on relevant theoretical framework to provide a solid foundation and consolidate the analysis. A study of this kind requires a suitable conceptual framework as a value anchor. In this regard, this study has been premised on the theory of social change. Incidentally, it is to be noted that extension workers are agents of change and ICT is a tool of change too.

3.2 Social Change Theory

Development is a word that has been variously defined and understood by people. In the opinion of Rogers and Burdge (1972): 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. Hence, according to them, development corresponds to modernization at the social system level. Thus we speak of the development of a nation and the modernization of an individual, they concluded.

The concept of rural development is not a new issue. In fact, from the creation of the world, through the "stone age", through the medieval, to the modern time, mankind has been undergoing one type of development or the other. Successive governments have been faced with the challenge of paying attention to the lives of the rural and urban poor. Contributions to rural sociology and securing improvement of socio-economic

condition of the rural people have been given due emphasis by social researchers and appropriate theories have been applied (Igbokwe, 2005).

Studies abound in rural sociology focusing on such areas as rural poverty, rural production processes, natural resource conservation, indigenous knowledge systems, and rural institution in social change. Ladele (2005) outlined some of the rural development practices in operation in Nigeria and other African countries, namely: (a) Rural-urban interaction, (b) Intersectoral/Zonal Coordination, (c) The Package approach; and (d) Community-Driven Development (CDD) approach; and identified problems of rural development in the Nigerian context. He explicitly concluded, among other things, that appropriate development strategy should be designed by each country based on her peculiarities and developmental antecedents.

Ekong (2003) noted that the rural area is very important because 70% of the people live and get their livelihood therefrom. Rural areas compared to the urban areas, are usually characterized by features such as: low productivity; low income; lack of education; technical inefficiency; inadequate social, institutional and physical infrastructures; low standard of living; and high poverty level. A report, Commonwealth Secretariat (1976) on an International workshop, outlined a number of problems in rural development by Governments in Africa. Some of them are: Export oriented planning system for rural development, wrong perception of farmers, lack of planning, monitoring and evaluation, one sided focus of rural development in agricultural sector, planning without implementation, and role conflicts between change agent and sponsoring

agency. Others include: shortage of resources and infrastructural facilities, lack of full attention of the researchers and educators to rural development course, misunderstanding of change agent on rural communities and lack of follow-up. Most of these problems are still relevant to Nigerian situation today.

Wikipedia (2010b) stated that: Functionalists perceive society to be a system comprising various functions that operate collectively to maintain order and stability. It further stated that, ccording to Talcott Parsons, one of the leaders of this school, change stems from other social systems (through, for instance, cultural influence, as in the case of English education in the former colonies of the British Empire) and tensions and strains within the system itself, especially those related to economic activities.

Rogers and Burdge (1972) defined social change as: "the process by which alteration occurs in the structure and function of a social system." Examples of social change, in their view, include issues such as; national revolution, the invention of a new manufacturing technique, the founding of a village improvement council, and the adoption of birth control methods by a family. Explaining further, on the process of change, they presented it in three sequential steps, namely; (1) Invention, (2) Diffusion, and (3) Consequences. Their definitions of each of these are as follows:

Invention is the process by which new ideas are created or developed. **Diffusion** is the process by which these new ideas are communicated to the members of a social system. **Consequences** are the result of the adoption or rejection of the innovation. Change occurs when a new idea has an effect.

Jibowo (2000) described Social change as when viewed within the context of a social system, it is the alteration in the values, norms, social roles, habits, obligations of people, or change in life-style, life goals, chances, environment, or in the composition or organization of their society. Eisenstadt (1973) made a tremendous contribution to the theory of social change by giving a focus on the functionists' perspective on structural change and modernization. He asserted that every social system has a propensity for change. Its development was traced to Europe, which had owed much to its various traditions, city-state, imperial and feudal, and more, to the development of commerce and secularism. It was reported that Protestants Reformation played a crucial role in the eventual restructuring of Europe in the fifteen century (Moore, 1963).

In the Functionalist perspectives, Social Change can occur at both micro level and macro level. At micro-level, it involves the group and people within one's immediate environment while at macro-level, it involves the economic, political and educational systems. According to Haralambos and Holborn (2004), functionalism holds that the economy is solely responsible for solving the societal problems, with industrialism playing crucial and significant role.

In Nigerian context, there is the drive for change and development, and this is being promoted through the instrumentality of ICT. With the gradual exposure of the rural areas to the ICT, VEAs, as agents of change, are in good position to exploit the available technologies in their trainings and information exchange i.e. a change from traditional person-to-person communication to digital communication in all ramifications. For, it is expedite of them that for a meaningful extension service delivery and innovation adoption to be achieved, the deployment and application of ICT would

go a long way in improving agricultural practices, production, productivity just like in the advanced countries that have used ICT appropriately.

This study therefore presents an emerging trend, indeed a change from *person-to-person communication/information* method, to the use of modern technologies and devices in information and communication by the extension agents. This change is envisaged to bring about improvement and efficiency in their work relation and job performance.

3.3 Model for this Study

A typical model that illustrates relationship between Causal, Intervening and Output variables, was provided by Harsey and Blanchard (1982). This study derived inspiration from the model, however, with slight modification and application. Figure 1 illustrates the conceptual framework upon which this study is based. It depicts the factors (both socio-economic characteristics and perceptions of VEAs) that influenced ICT usage, and the resultant effects on the users.

3.4 Independent Variables

The first column contains the Independent variables. In this study, the Independent variables were socio-economics characteristics and perceptions of VEAs. Osuala (1987) defines a variable as symbols to which numerals or values are assigned. The variable X may take on any (*sic*) justifiable set of values for example, scores on an intelligence test or an attitude scale. He further categorizes variables into three, namely: (1) Independent and dependent variables, (2) Active and attribute variables, and (3) Continuous and categorical variables.

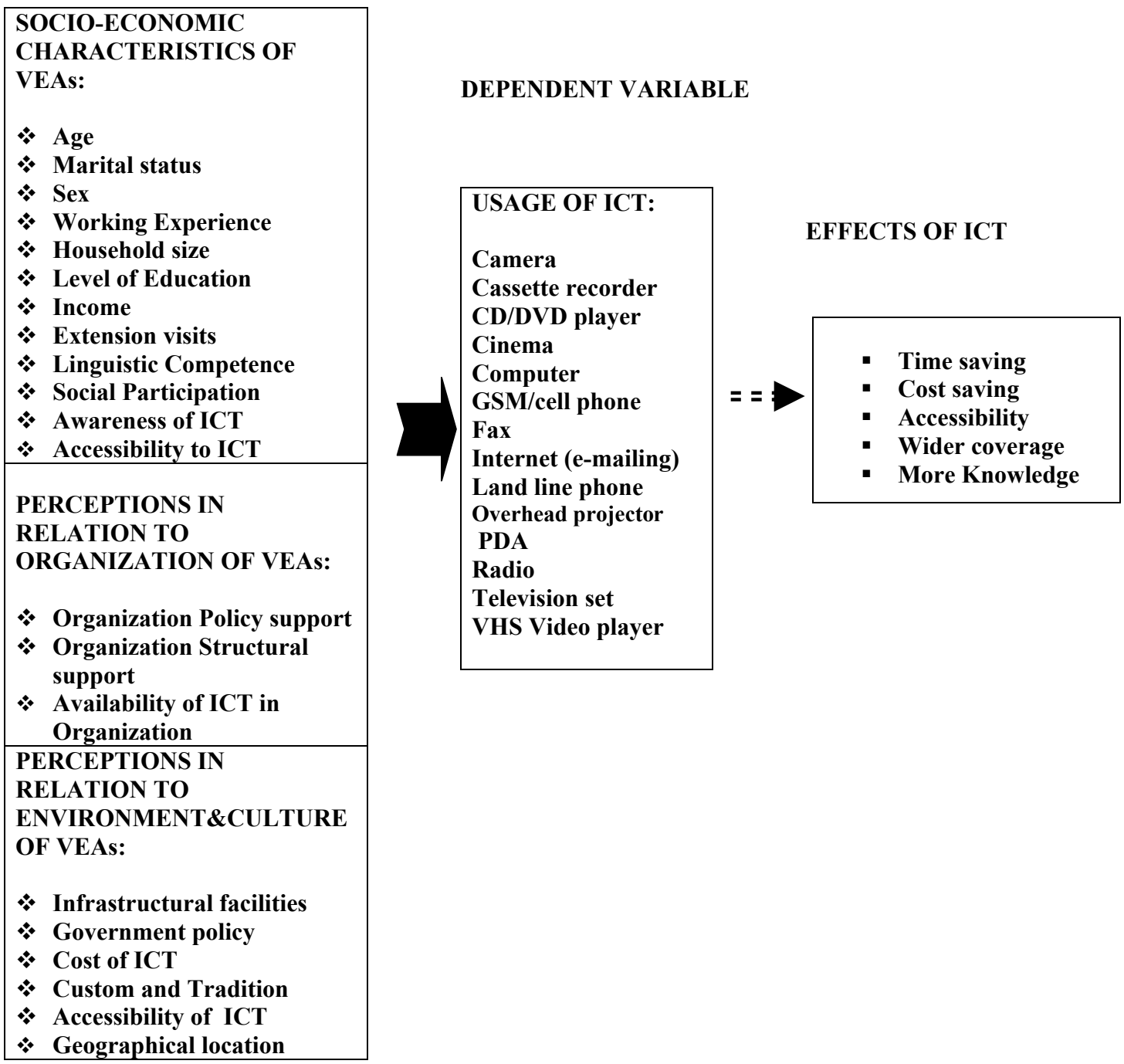


Figure 1: Model of factors influencing use of ICT by Extension Agents and the effects

KEY:

VEAs = Village Extension Agents

ICT = Information and Communication Technologies

In this context, **Socio-economic factors were** characteristics of the VEAs, namely: Age, Level of Education, Extension Visits, Awareness, Income, Social participation and Working experience. Others include; Linguistic competence, Marital status, Sex, Household size, Awareness of ICT and Accessibility to ICT.

Organizational factors as perceived by the VEAs are:

1. Availability of ICT by Organization
2. Organization's Policy on ICT
3. Organization structure in support of ICT

Environmental /cultural factors as perceived by the VEAs are**:**

1. Available infrastructural facilities
2. Accessibility of ICT
3. Cost of ICT
4. Government's Policy on ICT
5. Customs and tradition
6. Geographical location

It is assumed that these characteristics/perceptions of the VEAs influenced their usage of ICT. Hence, theoretically, the Independent Variables (both VEAs' characteristics and perceptions) are expected to influence the usage of ICT. Thus, in this study, the Independent Variables(Xs) are expected to predict the Dependent Variable (Y).

3.5 Dependent Variable

The second column (in Figure 1) indicates the Dependent Variable which is the Usage of ICT by VEAs. The dependent variable is the usage of the selected 14 ICT components such as: Land-line phones, GSM phones, radio, television, computer, internet and e-mailing, cinema, CDs/DVDs Video, Cinema, Camera, Over-head projectors, VHS Video Player, Pocket devices (PDAs) and Cassette recorder. Thus, in this study, the general concept is that the factors arising from the socio-economic characteristics and perceptions of VEAs in relation to institutional and environmental effects (Independent variables) are expected to influence usage of ICT components (Dependent Variable).

3.6 ICT EFFECTS ON USERS

The third Column (in Figure 1) depicts the expected results of the usage of ICT. It indicates the resultant **ICT Effects on Users** in terms of (1) Time saving (2) Cost saving (3) Accessibility, (4) Wider Coverage, and (5) More knowledge.

It is imperative to ascertain the validity and reliability of the instrument an investigator would use for measurement (Araoye, 2004; and Osuala,1987). As part of preliminary preparation for the instrument to be used, a questionnaire was prepared and pre-tested with a validity result (r=0.79) of response from selected 32 VEAs.

CHAPTER FOUR

METHODOLOGY

4.1 The Study Area

This research focused on ICT usage among the extension agents of the Agricultural Development Programmes (ADPs) in Kaduna, Kano and Kebbi States of the North-West Geo-political Zone of Nigeria (Figure 2). The respondents chosen for this study were the Village Extension Agents (VEAs).

4.2 The Climate and People

The North-West Agricultural Zone of Nigeria lies between latitudes 9^0 N and longitudes 14^0 N (Kowal and Knabe, 1973). The mean annual rainfall ranges from 500 mm to 1200 mm falling for about 3-5 months in a year during which the crops are grown. It has an expanse of land area of about 192,911 km^2 (Shaib, *et al.* 1997).

The North-West Agro-ecological Zone has a combined population of about 35.8 million (National Population Census, 2006), 80% of which lives in the rural areas. The ethnic groups found in the zone are the Hausa, Fulani, Kaje, Kataf and Zuru. The Zone has two major river basins namely, Sokoto and Hadejia-Jam'are.

The zone has arable land classified into upland (*gona*) and bottom land/lowland (*fadama*) used for both rainfed and irrigated agricultural practices respectively. The major crops produced in the zone include: maize, sorghum, cowpea, groundnut, rice, cotton, wheat, tomato and pepper. The zone is reputed for

production of cattle, goats, sheep, poultry, rabbits, pigs, camels, sheep, horses, and donkeys. The major rivers of the zone (the Rima, Kano, Hadeijia and Kaduna) and their tributaries as well as reservoirs and lakes provide opportunity for fishery.

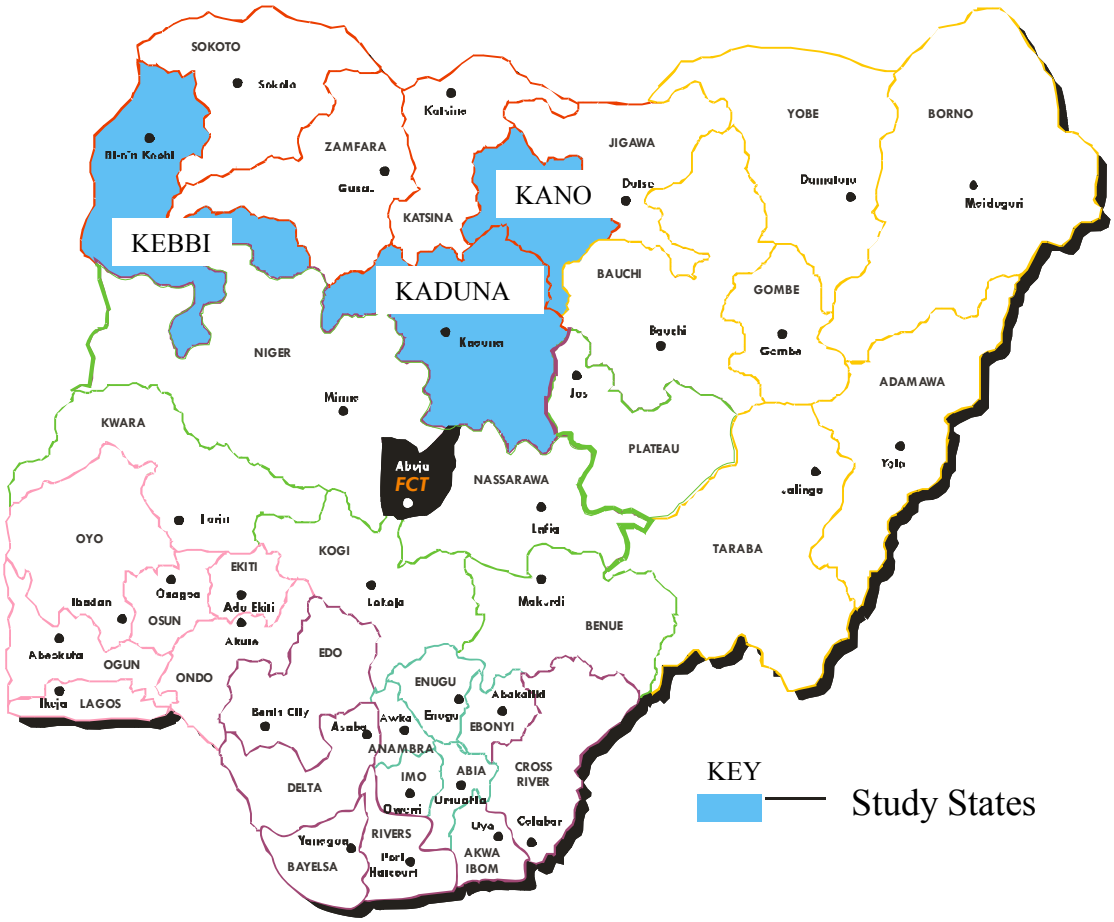


Figure 2: Map of Nigeria showing the three States (Kaduna, Kano and Kebbi) where the study covered.

4.3 Sampling technique and sample size

The general population of this research was the VEAs in the North-West Geopolitical Zone of Nigeria comprising seven States, namely: Kaduna, Kano, Katsina, Kebbi, Jigawa, Sokoto and Zamfara states). Out of seven (7) states in the North-West Geopolitical Zone, three States' ADPs (Kaduna, Kano and Kebbi States) were purposively chosen for this study taking into cognizance the need to give geographical representation and coverage of the Zone (i.e. three states chosen out of seven states constituted 42%).

From the total number of the VEAs' population (1,018) in the zone, 20% (i.e. 204 VEAs) was randomly selected as respondents. The breakdown of respondents was 111, 48 and 45 from Kano, Kaduna and Kebbi States' ADPs respectively (Table 1).

Table 1: The population and sample sizes of the VEAs.

S/No	State ADPs	Number of the VEAs	Sample size (20%)
1	Kebbi State ADP (KARDA)	226	45
2	Kaduna State ADP (KADP)	241	48
3	Kano State ADP (KNARDA)	551	111
	Total	**1018**	**204**

4.4 Method of Data Collection

Oyejola (2003) stressed that it is essential that due attention should be given to collection of accurate data as the quality of information collected would determine the quality of conclusion that would be reached. The main instrument used for gathering the data for this study was a questionnaire administered to VEAs who were selected from the ADPs of the three States. The data were collected between September, 2009 and March, 2010.

Other relevant and useful secondary data were used to support the findings of this study and such data were sourced from the State ADPs' libraries, world-wide web/internet and The Essential Electronic Agricultural Library (TEAL).

4.5 Operational Definitions and Measurements of Variables

4.5.1 Independent Variables

The Independent variables, in this study, were the socio-economic characteristics and perceptions of VEAs. These variables were measured as follows:

(a) Socio-economic characteristics of VEAs

Age (X_1)

Generally, this is defined as the length of time (in years) a person has lived or existed. In this study, it was assumed that age would influence the VEAs' usage of ICT. Age is noted to be important in role play, social activities and attitude. It was assumed therefore that the older the VEA, the more tendency he/she has in using ICT. Hence, age was included in the variables measured. Consequently, age was measured as the actual age of the respondent as at the time of data collection. Hence, age in this study, was expected to be positively related to ICT usage.

Household size (X_2)

This is defined as the total number of people living in a given household as at a particular point in time. The household size of a VEA was considered an important factor that could influence his/her usage of ICT. This variable was measured as the number of persons living under the care of the respondent. The assumption here is that the larger the household size of a VEA, the tendency for more social activities and demand from the family members, and thus, the more the propensity for the usage of ICT. Household size, in this study, was expected to be positively related to ICT usage.

Extension visits (X_3)

The extension visits is part and parcel of the functions and activities of VEAs as a change agent. The number of visits an extension agent makes creates awareness, serves as avenues through innovation and diffusion takes place. Atala (1981) and Voh (1979) have demonstrated the importance attached to extension contact as a means of diffusion of innovation.

This study assumed that the number of extension visits that a VEA makes could determine his/her usage of ICT. It was expected that the more the extension visits that a VEA makes determines the propensity for utilization of the ICT in the discharge of his/her duty. Therefore, it was measured as the average number of visits made by VEA to contact farmers per month as at the time of the study. Extension visits, in this study, was expected to be positively related to ICT usage.

Level of Education(X_4)

According to Wikipedia (2011c), **"Education** in the largest sense is any act or experience that has a formative effect on the *mind*, *character* or physical ability of an

individual". Furthermore, in its technical sense, it stated, education is the process by which society deliberately transmits its accumulated *knowledge*, *skills* and *values* from one generation to another.

Education refers to the acquisition of knowledge, abilities, skills and instructions through trainings obtained from school or at home, formal or informal system. It is believed that education can impact on the rate of innovation acceptance. This was considered as a variable that has capacity to influence the ICT usage by VEAs. It was assumed that the higher the educational level of the VEA the tendency to use the ICT. This was measured as the highest educational attainment of the respondent. The listed educational attainments were: No formal Education = 0; Quranic Education; Primary School; Adult Education; Secondary School ; OND; HND; B.Sc., and M. Sc./Ph. D. Therefore, educational level, in this study, was expected to be positively related to ICT usage.

Income (X_5)

According to www.investor.com (2011), for individuals, income is money earned through employment and investments. Wikipedia (2011b) defines income as:

"for households and individuals, income is the sum of all the wages, salaries, profits, interests payments, rents and other forms of earnings received.... in a given period of time."

Income, in this context, refers to the amount VEAs receives as either salaries or other activities that could improve his/her living. Once the earnings, accruable money realized from all enterprises increased, there tend to be corresponding increase in spending. This study assumed that Income of VEA could determine the usage of ICT. The assumption here is that the higher the income of the VEA, the tendency for the use of ICT. This was measured as the estimated income of the respondent per annum (in ₦ value). It was assumed that the higher the more income of the VEA, the more

propensity for the usage of ICT. Income, in this study, was expected to be positively related to ICT usage.

Linguistic Competence (X_6)

This refers to the language (s) that the VEAs are competent in or speaking fluently. It is expected that the versatility of a person in terms multi-linguistic competence tend to make the social life more active. It was assumed that the linguistic competence of VEA could influence the usage of ICT. This variable was measured by obtaining the total number of languages the VEA was able to speak fluently. Hence, in the study, linguistic competence was expected to be positively related to ICT usage.

Working experience (X_7)

The study presumed that working experience was a strong factor that could influence the usage of ICT. The assumption is that the more the working experience the VEA has, the more propensity for the ICT usage. This variable was therefore measured as the number of years the respondent has been working as extension agent. Working experience, in this study, was expected to be positively related to ICT usage.

Social participation (X_8)

Social participation, in this context, refers to the social activities that VEA engages in. The social activities tend to exert some considerable responsibilities on an individual. The study considered the level of social participation of VEA as a factor that could influence his/her ICT usage. It was assumed that the higher the number of social groups a VEA belonged to could influence the usage of ICT. This variable was measured as the total number of social groups/organizations/associations which VEA

was affiliated with. Social participation, in this study, was expected to be positively related to ICT usage.

Marital status (X_9)

This study assumed that the marital status of VEA could determine his/her usage of ICT. The marital status of a VEA was viewed as a factor that could affect his/her disposition to use ICT. Generally, it was measured as: Single =1 or Married =2. Marital status, in this study, was expected to be positively associated with ICT usage.

Sex (X_{10})

In this study, Sex was presumed as a factor that could determine the usage of ICT. Sex was viewed as a determinant that could influence the propensity to ICT Usage by VEAs. Gender bias has been associated with ICT (Richardson, 2010 and O'Farrell, 2003). It was therefore assumed that gender factor could play a dominant role in the life of a VEA. Consequently, Sex was measured in the context of: Male=1 or Female=0. Consequently, an association is suspected to exist between sex and ICT usage.

Awareness of ICT (X_{11})

It was assumed in the study that awareness of ICT by VEA is a prerequisite for its usage. Hence, the awareness of ICT by VEAs was considered as a variable that could influence ICT usage. Basically the score was apportioned as: Aware= 1, and Not aware=0. This variable was measured by summing up all the scores of awareness of all the 14 selected ICT components.

Accessibility to ICT (X_{12})

It was assumed in this study that Access to ICT by VEA is a prerequisite for its usage. Hence, the accessibility of ICT by VEAs was considered as a variable that could

influence ICT usage. Basically, it was scored as follows: Have Access= 1 and No access=0. This variable was measured by summing up all the scores of accessibility to all the 14 selected ICT components.

(b) Perception of VEAs in Relation to Organizational Factors:

VEAs' Perception on Availability of ICT by Organization (X_{13})

This was considered a variable that could affect ICT usage by the VEAs. The perception of VEAs on the availability of ICT in the organization was measured as a variable using Likert 3- point scale as; Inadequate =1, Unsure =2 and Adequate=3.

VEAs' Perception on Organization Policy in support of ICT (X_{14})

This was considered a variable that could affect ICT usage by the VEAs. The perception of the VEAs on organization's Policy in support of ICT was measured as a variable using Likert 3-point scale as; Not supportive =1, Unsure =2 and Supportive =3.

VEAs' Perception on Organization structure in support of ICT (X_{15})

In the study, this was considered a variable that could affect ICT usage by VEAs. Hence, the perception of the VEAs on whether the organizational structure was in support of ICTs or not and its influence on his/her usage of ICT was viewed as a variable. This was measured as a variable using Likert 3-point scale as; Not supportive = 1, Unsure=2 and Supportive =3.

(c) Perception of VEAs in Relation to Cultural and Environmental Factors:

VEAs' Perception on Government policy (X_{16})

This was considered a variable that could affect ICT usage by VEA. The

perception of the VEAs on the Government policy support of ICT was measured as a variable using Likert 3-point scale of; Unfavourable =1, Unsure =2 and Favourable=3.

VEAs' Perception on Cost of ICT (X_{17})

This was considered a variable that could affect ICT usage by VEA. The Perception of VEAs on the Cost of ICT was measured as a variable using Likert 3-point scale of; Not relevant=1, Unsure =2 and Relevant=3.

VEAs' Perception on Availability of ICT Infrastructural facilities (X_{18})

This was considered a variable that could affect ICT usage by VEA. The degree of VEAs' perception of Availability of ICT Facilities was measured as a variable using Likert 3-point scale of; Inadequate =1, Unsure =2 and Adequate=3.

VEAs' Perception on Customs and Tradition(X_{19})

This was considered a variable that could affect ICT usage by VEA. The Perception of VEAs on Customs and tradition was measured as a variable using Likert 3-point scale of; Unfavourable =1, Unsure =2 and Favourable=3.

VEAs' Perception on Accessibility of ICT facilities (X_{20})

This was considered a variable that could affect ICT usage by VEA. The perceived accessibility of ICT facilities within VEAs' reach was measured as a variable using Likert 3-point scale of; Inadequate =1, Unsure =2 and Adequate=3.

VEAs' Perception on Geographical location (X_{21})

This was considered a variable that could affect ICT usage by VEA. The

Perception of VEAs on the Geographical location was measured as a variable using Likert 3-point scale of; Not relevant=1, Unsure =2 and Relevant=3.

4.5.2 Dependent Variable

A dependent variable explains a phenomenon. In measurement of the Dependent variable, each of the fourteen (14) listed **ICT components** was assessed on the basis of extent of usage of each ICT components. The **ICT Usage**, in this context, was defined as the extent to which VEAs use of the selected ICT components in carrying out their work. This was measured with the aid of Likert scale (Very often =4, Often=3, Rarely=2 and Not at all=1). Consequently, from these scores, the maximum total extent of ICT Usage score obtainable per respondent is 56.

Hence, for the study specifically, the Extent of ICT Usage (EIU) was calculated as follows:

$$\text{EIU} = \frac{\text{Total Score of ICT Usage}}{\text{Maximum obtainable score of ICT Usage}} \text{ x } 100$$

The total score for all the 14 selected ICT components was calculated in order to determine the **Extent of ICT Usage (Y).**

4.5.3 Effects of ICT on Users

The **Effects of ICT on Users** were measured in terms of VEA's consideration of: (1) Time saving (2) Cost saving (3) More Accessibility (4) Wider coverage, and (5) More knowledge. In this connection, each effect was measured using five-point Likert Scale: Very High=5, Moderately High=4, High=3, Low=2 and Very low=1. The sum of each value of effects was calculated from the score allotted by the respondents.

4.6 Analytical techniques

Data collected from the field were decoded and analyzed using Statistical Package

for Social Sciences (SPSS) as described by Adekoya and Ogunfiditimi (2004). Descriptive statistics (e.g. Frequencies, percentages, means and weighted means) were used to analyse the data. Regression analysis was carried out to test the set hypothesis.

Correlation model

Pearson's Product Moment Correlation (r) was used to measure the relationship between independent variables and dependent variable. In the correlation model, the classical coefficient of multiple determination is a measure of association between the dependent random variable Y and the random vector of independent variables x. In this study, it was used to measure the association between the independent variables (x) and dependent variable (Y). Thus, two variables are considered to be correlated when they tend to vary together. According to Araoye (237:2004), "The aim of Pearson's Correlation Coefficient (r) is to measure the precision of the linear relationship between two variables".

The formula is:

$$r = \frac{\sum (x_i - x)(y_i - y)}{\sqrt{[\sum ((x_i - x)^2 \sum (y_i - y)^2]}}$$

$$= \frac{Sxy}{\sum Sxx\ Syy}$$

Where: S_{xy} = Sum of product of x and y

S_{xx} = Sum of squares of x

S_{yy} = Sum of squares of y

In this study, the 5% level of probability was used in evaluating the bivariate relationship among independent and dependent variables.

The multiple regression model

The Regression Model, on the other hand, was used to establish influence between VEAs' characteristics and ICT usage. The multiple regression model is explicitly specified as follows;

$$\mathbf{Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 , \ldots\ldots_{21} x_{21} , + e}$$

Where:

Y= Rate of ICT Usage (%)

$\mathbf{b_0}$ = Constant

X_1= Age (years)

X_2 = Household size (number)

X_3 = Extension visits (number per month)

X_4 = Level of Education (highest qualification)

X_5 = Income (₦/K)

X_6 = Linguistic competence (Number of languages)

X_7 = Working experience (years)

X_8 = Social participation (number of group membership)

X_9 = Marital status (Single= 0, Married = 1)

X_{10} = Sex (Female=0, Male=1)

X_{11} = Awareness of ICT (Number of ICT known)

X_{12} = Accessibility to ICT (Number of ICT accessible)

X_{13}= Availability of ICT in Organization(Perception, using Likert scale 1-3)

$X_{14=}$ Organization's Policy support of ICT (Perception, using Likert scale 1-3)

X_{15}= Organization's Structure in support of ICT (Perception, using Likert scale 1-3)

X_{16}= Government policy on ICT (Perception, using Likert scale 1-3)

X_{17}= Cost of ICT (Perception, using Likert scale 1-3)

X_{18} = Available infrastructural facilities (Perception, using Likert scale 1-3)

X_{19} = Customs and tradition (Perception, using Likert scale 1-3)

X_{20} = Accessibility of ICT facilities (Perception, using Likert scale 1-3)

X_{21} = Geographical location (Perception, using Likert scale 1-3)

$\mathbf{b_1 - b_{21}}$ = Regression co-efficients

e = Error term

In this study, Multiple Linear Regression model was used to determine the linear relationship between the Independent and Dependent variables. It was applied to analyse the influence of VEA's characteristics and their Usage of ICT. Specifically, the Multiple Linear regression was used to determine or predict those factors influencing the ICT usage by the VEAs. The regression co-efficients in this study were evaluated at 10% level of probability in choosing for acceptability or otherwise of the parameters of the variables under consideration.

CHAPTER FIVE

RESULTS AND DISCUSSION

5.1 Introduction

This Chapter presents and discusses the results of the study. Consequently, the results of data analysis for the six (6) objectives of the study are presented and discussed.

5.1.0 Socio-economic characteristics of VEAs and their perceptions.

The following are the findings on the socio-economic characteristics of the VEAs and their perceptions.

5.1.1 Socio-economic characteristics of the Village Extension Agents (VEAs)

Table 2 shows that majority (78%) of the respondents were between 30 - 49 years old. An overwhelming number (89%) of the extension agents were males, about 79% were married and 83% were from household size of 1-10 members. Considerable proportion (44%) of them had HND, followed by those (34%) who had OND – indicating that they are literate and by virtue of their education, could appreciate ICT's relevance and usefulness.

With reference to working experience, 51% of had 19 years and above, 12% of them had 15-18 years working experience. Thus, this is an indication that they were well experienced in their jobs and this gave them advantage of appreciating ICT's role. Majority of the respondents (32%) had extension visits of 1-5 per month which shows that they were actively involved in carrying out their function of making contacts with farmers. On social participation, 42% of the respondents belonged to only 1 group, and on their linguistic competence, majority (71%) spoke 2 languages frequently – thus indicating their high linguistic competence. On their income, most (48%) were in the income range (₦301,000.00 – 400,999.00). Their income level shows that they were low earners civil servants which may affect their standard of living and performance at work. The awareness level on ICT components of the respondents show that the largest percentage (14%) were aware of all the selected 14 ICT components, thereby giving the impression that their awareness level was generally high. On their Accessibility to ICT,

results show that the largest percentage of them (45%) had access to 5 - 8 ICT components.

Table 2: Distribution of respondents based on their socio-economic characteristics (n=204)

Socio-economic characteristics of the respondents	Frequency	Percentage (%)	Mean
Age (years)			
20-29	21	10.3	
30-39	40	19.6	
40-49	120	58.8	40.83
50-59	23	11.3	
Gender (Sex)			
Male	182	89.2	1.11
Female	22	10.8	
Household size			
1-10	169	82.9	
11-20	32	15.7	6.76
21-40	3	1.5	
Marital status			
Single	25	11.0	
Married	179	78.9	1.88
Extension visits (No per month)			
0 – 5	65	32	
6 – 10	33	16.2	
11 – 15	45	22.1	
16 – 20	46	22.6	5.42
21- 30	12	5.9	
31 – 45	3	1.5	
Level of education (highest attainment)			
Primary School	2	0.9	
Secondary School	19	8.4	
OND	78	34.4	
HND	100	44.4	
B. Sc.	5	2.2	

Table 2 continued: Distribution of respondents based on their socio-economic characteristics (n=204).

	Frequency	Percentage (%)	Mean
Working experience(years)			
<3	23	11.3	
3 – 6	15	7.4	
7 – 10	12	5.9	4.72
11 – 14	12	5.9	
15 – 18	26	12.7	
19 and above	116	56.8	
Social participation (No. of groups)			
0	28	12.8	
1	86	42.2	
2	64	31.3	
3	21	10.3	1.47
4	4	1.9	
6	1	0.5	
Income (₦ per annum)			
₦1 - 120,999	21	10.3	
₦121,000 – 300, 999	42	20.6	
₦ 301, 000 – 400, 999	62	30.4	
₦ 401,000 – 500, 999	33	16.2	376,400
₦ 501,000 – 600, 999	19	9.3	
₦ 601,000 and above	27	13.2	
Linguistic competence (No. of languages)			
1	5	2.5	
2	144	70.5	
3	54	25.5	2.25
4	1	0.5	
Awareness of ICT (No. of ICTs)			
1-10	108	52.9	
11	14	6.9	
12	29	14.2	9.62
13	24	11.8	
14	29	14.2	
Accessibility to ICT (No. of ICTs)			
0 – 4	44	21.6	
5 – 8	92	45.1	
9 – 12	60	29.4	7.03
13-14	8	3.9	

5.1.2 The VEA's Perceptions of the Organizational Factors in Relation to ICT

Usage

1. VEA's Perception in relation to Availability of ICT by Organization

In Table 3, concerning the perception of the respondents in relation to availability of ICT by organization influencing their ICT usage, the results show that 49% of the respondents were of the view that their Organization's availability of ICT was adequate, and 36% of them considered inadequate while the remaining 15% them were unsure.

2. VEA's Perception in relation to Organization's Policy Support on ICT

The results in Table 3 show that the majority (71%) of the respondents considered their Organization's policy support on ICT as supportive in influencing their ICT usage, while 17% of them were unsure if their Organization's policy on ICT could influence their usage of ICT. The remaining 12% of the respondents conceded that their organization's policy support on ICT was not supportive enough to influence their ICT usage.

3. VEA's Perception in relation to Organization's Structural support of ICT

With reference to Table 3, the results indicate that majority 68% of the respondents considered their organization's structural support on ICT as not supportive in influencing their ICT usage. The result shows that 21% of the respondents were unsure if their organization's structural support on ICT influenced their usage of ICT and the remaining 11% of them considered it was supportive.

Generally, the results of the calculated weighted means indicate that the respondents were conclusive, in their perceptions, by concurring that Organizational availability of ICT, and organizational policy on ICT were adequate and supportive respectively. However, the respondents were conclusive by agreeing that organizational structure in support of ICT was not supportive enough (with the weighted mean score of 1.43).

Hence, the foregoing finding corroborates Adesope and Matthew-Njoku (2005)

who found that perceptions statement of their respondents indicated that ICT can facilitate research-extension institutions linkage for effective agricultural information dissemination. This lay credence therefore to the fact that perception is a predictor of one's character/attitude.

Table 3: Distribution of the respondents based of their perception of organizational factors on ICT Usage (n=204)

Perceptions on Organization factors in relation to ICT usage	**Frequency**	**Percent age (%)**	**Weighted sum**	**Weighted mean score(π)**
Organization Availability of ICT				
Adequate	100	49.0	300	
Unsure	31	15.2	63	2.14
Inadequate	73	35.8	73	
Total	**204**	**100**	**436**	
Organization Policy on ICT				
Supportive	144	70.6	432	
Unsure	35	17.2	70	2.58
Not supportive	25	12.3	25	
Total	**204**	**100**		
Organization Structure in support of ICT				
Supportive	22	10.8	66	
Unsure	43	21.1	86	1.43
Not supportive	139	68.1	139	
Total	**204**	**100**	**291**	

Furthermore, this finding concurs with Yuen *et al.,* (2008) that teacher's perception on student-practice orientation was the strongest predictor of student-impact than other factors. In addition, this agreed with Apatanku and Lawal-Adebowale (2009) who found that the Organizations Usage of the device of ICT for agricultural activities (including Computers, CD-ROM, Diskettes and Web-Pages) for documentation and information dissemination and their programmes were aired on radio and television (TV).

However, the finding is at variance with Yekinni and Hussein (2008) who reported that the extent of use of available ICT facilities had not significantly influenced

their perception of the importance of the facilities to their work schedule.

5.1.3 The VEA's Perceptions on Environmental /Cultural factors in Relation to ICT Usage

1. VEA's Perception in relation to Availability of Infrastructure on ICT

Findings as shown in Table 4 revealed that most (42%) of the respondents perceived that availability of ICT infrastructure was inadequate in influencing their ICT usage. However, the result showed that 42% of them reported that availability of ICT infrastructure was adequate, while the remaining 16% of them were unsure.

2. VEA's Perception in relation to Accessibility to ICT

In Table 4, the results show, the respondents' perception on accessibility to ICT, that most (40%) of the respondents considered as inadequate in influencing their ICT Usage. However, result showed that 39% of them considered adequate in influencing their ICT Usage while the remaining 21% of them were unsure.

3. VEA's Perception in relation to Government Policy on ICT

Findings as shown in Table 4, reveal that the majority (59%) of the respondents perceived as favourable government's policy on ICT that it influenced their usage of it. On the same issue, further result shows that 23% of them considered unfavourable while the remaining 19% of them were unsure.

4. VEA's Perception in relation to Cost on ICT

Table 4 shows that the majority (53%) of the respondents considered cost relevant in influencing their ICT Usage. However, 25% of them were unsure while the remaining 22% of them considered cost not relevant in influencing their usage of ICT.

5. VEA's Perception in relation to Customs and Tradition

With reference to Table 4, the majority (71%) of the respondents perceived Custom/tradition favourable in influencing their ICT usage. However, result showed that 17% of them stated that it was unfavourable while the remaining 12% of them were unsure if it could influence their usage of ICT. Hence, it could be inferred that Customs/tradition is a strong factor in influencing their ICT usage.

6. VEA's Perception in relation to Geographical location

Findings in Table 4 reveal that the majority (70%) of the respondents considered geographical location as a factor relevant in influencing their ICT Usage while 17% them considered it not relevant. On the contrary, result showed that 13% them were unsure if it could influence their usage of ICT. Thus, it could be inferred that the geographical location of the VEAs is a strong factor in influencing their ICT usage.

In a nutshell, the results of the calculated weighted mean indicate that the respondents were conclusive, in their perceptions, by concurring and apportioning weighted mean scores as follows: that Perceptions of the respondents on Availability of Infrastructure on ICT(adequate 2.0) , Accessibility to ICT(adequate 2.0), Government Policy on ICT (favourable 2.36), Cost of ICT (relevant 2.30), Customs and tradition on ICT (favourable 2.54) and Geographical location(relevant 2.53) – all influenced their ICT usage, respectively. These figures were obviously equal to or above the expected weighted average of 2.0.

Table 4: Distribution of the respondents based on perception of Environmental/cultural factors on ICT Usage (n=204)

Perceptions on Environmental/cultural factors in relation to ICT usage	Frequency	Percentage (%)	Weighted sum	Weighted mean score (π)
Availability of Infrastructure on ICT				
Adequate	86	42.2	258	
Unsure	32	15.7	64	2.0
Inadequate	86	42.2	86	
Total	**204**	**100**	**408**	
Accessibility to ICT				
Adequate	79	38.7	237	
Unsure	43	21.1	86	2.0
Inadequate	82	40.2	82	
Total	**204**	**100**	**405**	
Government Policy on ICT				
Favourable	120	58.8	360	
Unsure	38	18.6	76	2.36
Unfavourable	46	22.6	46	
Total	**204**	**100**	**482**	
Cost of ICT				
Relevant	108	52.9	324	
Unsure	51	25.0	102	
Not relevant	45	22.1	45	2.30
Total	**204**	**100**	**471**	
Custom and tradition on ICT				
Favourable	145	71.0	435	
Unsure	24	11.8	48	2.54
Unfavourable	35	17.2	35	
Total	**204**	**100**	**518**	
Geographical location				
Relevant	143	70.0	429	
Unsure	26	12.8	52	2.53
Not relevant	35	17.2	35	
Total	**204**	**100**	**516**	

Consequently, the foregoing findings on the perceptions of VEAs in relation to environmental factors on ICT usage, is in agreement with other findings that found that the use of perceptions in studies. The findings also corroborate Yahaya *et al.,* (2006) that there is a significant relationship between attitude of rural dwellers and their perception of effectiveness of electronic media.

5.2 Level of awareness of and accessibility to ICT by VEAs.

5.2.1 Level of Awareness by VEAs

Radio

Table 5 shows the level of the respondents' awareness of radio was highly impressive as majority of the them (99%) were aware while just a negligible number of the VEAs (1%) claimed to be unaware. This lays credence to the fact that radio is a dominant source of information, and indeed a vital tool in agricultural information dissemination in rural areas. This situation is a confirmation of earlier reports by Voh (1981), Yazidu (1973), Aderinto *et al.*, (2008) and Murtala *et al*., 2007). Thus, radio was a veritable tool for both information dissemination and source of information which could assist in extension delivery and excellent job performance.

GSM/cell Phones

With respect to awareness of GSM/cell phones, in Table 5, results of analysis show that the majority (98%) of the respondents indicated they were aware of the GSM phones while a negligible proportion (3%) of them indicated they were not aware. This shows that the awareness of the respondents on Mobile phone is quite high.

Television (TV) set

The results in Table 5 show that majority (93%) of the respondents were aware of the existence of TV set, while a few (7%) of them were unaware of it. This shows that TV set is popular among the respondents. This is quite impressive considering the importance of television set in the dissemination of agricultural information today.

Cassette recorder

The result in Table 5 further shows that the level of the respondents' awareness of Cassette recorder was impressive as the majority (87%) of them were aware while only 13% of the VEAs were unaware. This situation could be attributable to the wide and extensive nature of its use coupled with low cost of purchase.

Compact Disk (CD)/Digital Video Disk (DVD) player

With reference to awareness of VCD/DVD players by the respondents, the findings on Table 5 indicate that majority of the respondents (79%) were aware of VCD/DVD players and 21% of them were unaware. By implication, the respondents were highly aware of VCD/DVD players. This might not be unconnected with the gradual dependence on CDs and DVDs as a means of data storage and retrieval in the information-driven world of today.

Video Home System (VHS) Player

Similarly, on awareness of VHS player, in Table 5, it is shown that a significant proportion of the respondents (77%) were aware of VHS video players while a few of them (23%) were unaware. This might be due to the popularity it enjoyed for many decades by reason of its constant use in Nigeria.

Camera

In Table 5, with respect to camera awareness, it was discovered that majority of the respondents (75%) were aware of the camera while the remaining 25% of them were unaware of it. The high awareness level might be attributable to the growing marketing and use of camera in Nigeria.

Cinema

The results on Table 5 indicate that awareness of Cinema among the respondents was high with 68% of them while only 32% of the VEAs were not aware. This development might be due to the gradual phasing out of and less reliance on cinema in extension information delivery to farmers with its attendant problems of high cost and inaccessibility.

Computer

The experience of the respondents on awareness of computer, in Table 5, shows that the level was generally a little above average as 60% of them while 40% of them were unaware. This situation could not be far from the cost of purchase, lack of purchasing power and accessibility to computers, and more importantly, because VEAs reside mostly in rural areas.

Overhead projector

On the awareness of overhead projector by the respondents, results in Table 5 indicate that 55% of them were aware of it while the remaining 45% of them were unaware. This might be attributable to the cumbersome nature of its components and the technical expertise required to handle it.

Landline phones

The findings on Table 5 indicate that awareness of landline phones (fixed phones) among the respondents was 54% of them while 46% of them were not aware. By implication, the respondents' level of awareness of fixed phones was low. This might not be unconnected with the gradual disappearance and usage of fixed/landline phones in Nigeria which is being fast replaced by GSM/cell phones.

Internet (E-mailing)

In Table 5, on the awareness of respondents on internet (e-mailing), a little above half of them (53%) indicated they were aware of Internet (e-mailing) while the remainder of them (47%) were unaware. This situation could be attributed to its low accessibility in the rural areas.

Fax

The respondents' experience with awareness of fax in Table 5 shows the vast majority of the VEAs (68%) were grossly unaware, while just 32% of them were aware. This situation could not be far from reason connected with the rarity of fax usage, its sophistication and special nature of communication it is used for.

Personal Digital Assistants (PDAs)

With particular reference to awareness of the respondents on PDAs, the results in Table 5 show the level was generally low with only 31% of them having the awareness while the vast majority of them (69%) of them were not aware. This situation could be due to the nature of PDAs' sophistication, complication and cost.

Table 5: Distribution of the respondents according to their level of awareness of ICT (n=204).

		Level of awareness			
S/No	**ICT Component**	**Aware**		**Not aware**	
		F	**%**	**F**	**%**
1	Radio	202	99.0	2	1.0
2	GSM phones	199	97.5	5	2.5
3	Television set	190	93.1	14	6.9
4	Cassette recorder	177	86.8	27	13.2
5	CD/DVD player	161	78.9	43	21.1
6	VHS Video player	157	77.0	47	23.0
7	Camera	153	75.0	51	25.0
8	Cinema	138	67.6	66	32.4
9	Computer	123	60.3	81	39.7
10	Overhead projector	113	55.4	91	44.6
11	Land line phones	111	54.4	93	45.6
12	Internet (e-mailing)	108	52.9	96	47.1
13	Fax	66	32.4	138	67.6
14	Personal digital assistant(PDA)	64	31.4	140	68.6

5.2.2 Level of Accessibility of ICT to VEAs

Radio

The result in Table 6 shows the level of the respondents' accessibility to radio sets was very high (98%) while only 2% of them did not have access. This finding further confirms the report that radio is widely used among rural people, indeed as an important medium of agricultural information dissemination as reported by Voh (1981), Yazidu,(1973), Aderinto *et al.*(2008), and Murtala *et al*. (2007). With this development, radio could serve as a veritable tool for both information dissemination and source of information which could assist them in extension delivery and performance of their job.

GSM phones

On the accessibility to GSM phones, the results in Table 6 show the level of the respondents' accessibility to GSM Phones (mobile phones) as generally high with 96% of them having access and just 4% of them lacking access. This situation might be attributed to the increasing growth in the proliferation and use of cell phones in Nigeria – with its attendant ease of access and reasonable cost.

Television (TV) set

The result in Table 6 shows the level of the respondents' accessibility to television sets which was generally high with 86% of them having access, while just a sizeable proportion of 15% who lacked access. This might be as a result of the moderate educational level of the VEAs and the nature of their jobs which is associated with sourcing for extension information through television.

Cassette recorder

The result as shown in Table 6 indicates the level of the respondents' accessibility to cassette recorder which was generally high with 78% of them having access while

just a sizeable proportion (22%) of them did not have access. The high level of the accessibility might be due to the fact that it is relatively cheap, the simplicity of its use and the inexpensiveness of audio tapes.

CD/DVD players

With respect to accessibility to CD/DVD, the result as shown in Table 6 indicates the level of VEAs' accessibility to CD/DVD players which was generally high with 72% of the respondents having access while 28% of them were without access. This development might be attributed to the sophistication of CD/DVDs.

VHS players

On the level of the respondents' accessibility to VHS players, the result in Table 6 shows that 60% of the respondents have access while 40% of them did not have access. This indicates that VHS players were still being used by the respondents.

Camera

The result in Table 6 shows the level of the respondents' accessibility to Camera. The access by VEAs was generally moderate with 52% of the VEAs while 48% of the VEAs did not have access to camera.

Cinema

On the accessibility to cinema, the result in Table 6 shows the level of the respondents' accessibility was just 32% while of them 69% lacked access. This indicated a gradual non-reliance on cinema by VEAs as extension information delivery tool.

Computer

With respect to accessibility of the respondents to computer, the result in Table 6 shows that the level was generally low (29%) while the majority (71%) of them did not

have access. This was contrary to the report of Adesope and Matthew-Njoku (2005) that found 85% of their respondents had access to computers while 15% did not have access.

Landline phones

With respect to accessibility to landline phones, the result in Table 6 shows the level of the respondents' accessibility to landline phones (fixed phones) which was generally low with 28% of them having access while the vast majority (72%) were devoid of access. This might be due to the gradual disappearance of fixed phones and the fast acceptance of mobile phones in Nigeria.

Internet (E-mailing)

The result in Table 6 shows the level of the respondents' accessibility to Internet (E-mailing). The access by the respondents was generally low with 27% of them while the vast majority (74%) of them did not have access. This situation might be due to the fact that the respondents were largely known to be resident in the rural areas where internet is less accessible.

Overhead projector

The result in Table 6 shows that the level of the respondents was generally low with the accessibility to overhead projector was19% of them having access while the majority (81%) of them did not have access. That the large proportion of the respondents were not having access to overhead projector might be attributed to the specialized nature of the technology.

Personal digital assistants (PDAs)

The result shows in Table 6 that the level of the respondents' accessibility to PDAs was generally low with only 19% of them having access while the majority (81%) did not have access. This might not be far from the fact that PDAs is costly and is

a novel and sophisticated device.

Fax

The result in Table 6 shows that the level of the respondents' accessibility to fax was generally low with 9% of them having access while the majority (91%) of them did not have access. This situation could be due to the lack of availability of fax facility and the complex nature of the work it is used for.

Table 6: Distribution of the respondents according to their level of accessibility to ICT (n=204).

		Level of accessibility			
S/No	**ICT Component**	**Accessible**		**Not accessible**	
		F	**%**	**F**	**%**
1	Radio	200	98.0	4	2.0
2	GSM phones	195	95.6	9	4.4
3	Television set	174	85.3	30	14.7
4	Cassette recorder	158	77.5	46	22.5
5	CD/DVD player	146	71.6	58	28.4
6	VHS Video player	122	59.8	82	40.2
7	Camera	106	52.0	98	48.0
8	Cinema	64	31.4	140	68.6
9	Computer	59	38.9	145	71.1
10	Land line phones	58	28.4	146	71.6
11	Internet (e-mailing)	54	26.5	150	73.5
12	Overhead projector	39	19.1	165	80.9
13	Pocket devices (PDAs)	38	18.6	166	81.4
14	Fax	18	8.8	186	91.3

5.3 The Extent of ICT usage by VEAs on their work

GSM phones

The result in Table 7 shows the extent in percentage of VEAs' usage of GSM

phones for their work. It indicates that 75% of the respondents used GSM phones very often, 17% often, 6% rarely and 2% not use it at all. This study therefore agrees with Atala and Umar (2006) who discovered that journalists have been assisted as GSM phone use has improved their work performance.

Also, it concurs with Aderinto *et al.,* (2008)'s report to the effect that 59% of the respondents used telephone. It further confirms Apatanku and Lawal-Adebowale (2009)'s report that ICT devices were owned and used by some agricultural extension and research organizations namely: computers, tele-fax, telephone, websites, E-mail, radio, television, and VCD/VCR thereby laying credence to the importance of these devices. Furthermore, it agrees with Busken and Webb (2009) that revealed the remarkable development in the use, throughout Africa, by women of ICT components such as mobile phones, CD-ROMs and internet.

Landline phones

With respect to usage of landline, results obtained in Table 7 shows that 6% of the VEAs used land-line phones very often, 21% often, 21% rarely and 53% not use it at all. Generally, the results show that land-line phones were poorly used by the respondents in their work. This might not be far from the fact that land-line phones were usually fixed and were already gradually being phased out as at the time of the investigation.

Television (TV) set

With reference to usage of television set, the result in Table 7 shows the respondents used television sets as follows: 32% of them used it very often, 24% often, 22% rarely and 23% of them used it not at all. This shows that television sets were moderately used the respondents in their work. Thus, this finding agrees with others that stressed the usage of ICT (Aderinto *et al.,* 2008; and Apatanku and Lawal-Adebowale,

2009).

Cinema

With regard to the usage of cinema, Table 7 indicates that only 3% of the respondents used it very often, 19% often, 29% rarely and 49% of them did not use at all. Generally, this result shows that cinemas were poorly used by the respondents in their work.

CD/DVD player

On the usage of CD/DVDs, results shown in Table 7 indicate that 16% of the respondents used it very often, 29% used it often, 22% used it rarely and 33% of them did not use it at all. This finding indicates a generally moderate usage of CD/DVD among the respondents.

VHS Video player

The result in Table 7 shows the extent in percentage of the respondents' usage of VHS Video players for their work. It indicates that 16% of the respondents used it very often, 27% often, 22% rarely and 36% of them did not use at all. This shows that VHS Video players were moderately used by VEAs in their work.

Camera

In considering the usage of camera, the result in Table 7 shows that 10% of the respondents used camera very often, 19% of them used it often, 37% used it rarely and 34% did not at all. This shows that cameras were not often used by the respondents in the performance of their job.

Internet (e-mailing)

Looking at the usage of Internet (e-mailing) by the respondents, the results in Table 7 show that only 2% of them used it very often, 10% often, 34% rarely and 53%

did not use it at all. This shows that Internet (E-mailing) was used poorly by the respondents in the performance of their job. This was contrary to Chete *et al.,* (2008) that found on operation of electronic e-Government, an assessment of a Government based website, that majority of the respondents (40%) agreed that phone contact, address contact, publications, link to other sites and data bases would help an ordinary citizen contact a Government agency. Also, 55% of the respondents stated that the use of E-mail would help citizens contact Government officials and make use of information on websites.

Computer

On the use of computer by the respondents, the result in Table 7 shows that 5% of them used it very often, 14% used it often, 33% rarely and 48% did not at all. This shows that Computers were poorly used by the respondents in the performance of their job. This finding support Levbaoje *et al.,* (2005) who looked at the level of preparedness of Field-level Extension workers on the use of some ICTs. Their findings showed that most of them (78%) did not use e-mail (internet) and 76% were not computer literate. However, this was contradicted by Adesope and Matthew-Njoku (2005) who reported that 85% of the respondents in their study had access to computers while 15% did not have access.

Overhead projector

The result in Table 7 shows that 0.5% of the respondents used overhead projector very often, 7% often, 29% rarely and 63% not at all. This shows that overhead projectors were poorly used by the respondents in the performance of their job.

Fax

The result in Table 7 on the use of Fax by the respondents shows that 2% used it very often, 2% used it often, 12% used it rarely and majority (85%) of them did not at all. This shows that Fax was poorly used by the respondents in the performance of their job.

Cassette recorder

On the use of Cassette recorder, the result in Table 7 shows that only 32% of the respondents used it very often, 28% often, 15% rarely and 25% not at all. This shows that cassette recorders were moderately used by the respondents in their work. Thus, this finding agrees with Masianini and Rokotuibau (2009) that reported on a typical ICT usage project involving extension workers and farmers in the Pacific in terms of ability to produce DVDs, printed guides, radio and TV programmes in strengthening rural economies.

Personal Digital Assistants (PDAs)

With reference to PDAs, the result in Table 7 shows that 5% of the respondents used it very often, 8% often, 17% rarely and 70% not at all. Generally, this result shows that PDAs were poorly used by the respondents in their work. This might not be unconnected with the fact that it is a sophisticated and expensive device/technology.

Radio

Concerning the use of radio, the result in Table 7 shows that 66% of the respondents used it very often, 17% used it often, 7% used it rarely and 10% did not at all. Thus, this finding agrees with other studies that asserted the usage of ICT. For example, Masianini and Rokotuibau (2009) exemplified a typical ICT usage project involving extension workers and farmers in the Pacific in terms of ability to produce DVDs, printed guides, radio and TV Programmes in strengthening rural economies. It also agrees with report by Mayer (2008) on Africa posited that radio was a dominant medium of mass communication and describing radio as a community source of information.

This shows that radio sets were highly used by the respondents in their work as a means of communication in the performance of their work. Consequently, with radio

they were adequately informed about agricultural information and could be assisted more effectively in delivering extension messages through it.

In summary, the results of the calculated weighted means indicate that the respondents agreed that, in their extent of ICT usage, had the following weighted mean scores: GSM phones (3.65), radio (3.38), cassette recorder (2.66) and television (2.65), respectively. These figures were obviously equal to or above the expected weighted average of 2.5. This indicates that these ICT components (i.e. GSM phones, radio, cassette recorder and television) were greatly used by the respondents in their work. However, the results on the calculated weighted means of other selected ICT components were below the expected weighted mean, namely: landline phones, cinema, CD/DVD player, VHS Video player, camera, internet, and computer. Others were: overhead projector, fax, and PDAs.

Table 7: Distribution of the respondents according to extent of ICT usage for their work.

		Extent of ICT Usage for work					
S/No	**ICT Component**	**Very often (F)**	**Often (F)**	**Rarely (F)**	**Not at all (F)**	**Weighted sum**	**Weighted mean (π)**
1	GSM phones	153(75)	34(16.7)	13(6.4)	4(2.0)	744	3.65*
2	Radio	134(65.7)	34(16.7)	15(7.4)	21(10.3)	689	3.38*
3	Cassette recorder	65(31.9)	56(27.5)	31(15.2)	52(25.5)	542	2.66*
4	Television set	65 (31.9)	49(24.0)	44(21.6)	46(22.5)	541	2.65*
5	Land line phones	12(5.9)	44(21.1)	42 (20.6)	106(52.5)	310	1.52
6	Cinema	6(2.9)	39(19.1)	59(28.9)	100(49.0)	359	1.76
7	CD/DVD player	33(16.2)	59(28.9)	44(21.6)	68(33.3)	426	2.10

8	VHS Video player	33(16.2)	54(26.5)	44(21.6)	73(35.8)	455	2.23
9	Camera	21(10.3)	38(18.6)	76(37.3)	69(33.8)	409	2.01
10	Internet (e-mailing)	4(2.0)	21(10.3)	70(34.3)	109(53.4)	302	1.48
11	Computer	10(4.9)	28(13.7)	68(33.3)	98(48.0)	358	1.76
12	Overhead projector	1(0.5)	14(6.9)	59(28.9)	130(63.7)	294	1.44
13	Fax	3(1.5)	3(1.5)	25(12.3)	173(84.8)	244	1.20
14	Pocket devices (PDAs)	10(4.9)	16(7.8)	35(17.2)	143(70.1)	301	1.48

* = ICT components with high weighted means
Note: Figures in parenthesis are percentages (%)

5.4 Relationship between the characteristics of the VEAs and influence on usage of ICT

The model used for this study posits the existence of a relationship between socio-economic characteristics/perceptions of the VEAs and usage of ICT.

Results of Pearson correlation (r) as shown in Table 8, indicates there is positive and significant association between the VEA's characteristics and ICT Usage,. For example, results of correlation co-efficients indicate that significant association exists between the respondents' characteristics/perceptions and ICT usage, namely; Access to

ICT and ICT usage (0.320**) at P=0.01 level, Perceptions on Government Policy and ICT usage (0.157*) at P=0.05 level and Perception on Customs/ tradition and ICT usage (0.141*) at P= 0.05 level.

From this finding, it can be deduced that as the VEAs' access to ICT increases so also their ICT usage; as there is an increment in the respondents' perception on Government Policy, so also a corresponding increment in ICT usage; and as the perception of the respondents on Custom /tradition increases, so does their ICT usage. Therefore, it was concluded that there existed positive and significant association between the variables, and were related to ICT usage.

This finding is in agreement with Violato *et al.,* (1989) and Koohang (1989) who found teacher's attitudes and perceptions have not been emphasized in the implementation of technology into the classroom, even though studies stated that teachers' attitudes, as well as knowledge and skills in using computers, are major factors affecting their initial acceptance of computer technology and their future behaviour regarding computer usage.

Similarly, Yuen *et al.,* (2008), in an exploratory study of teachers' perceptions, in factors predicting impact of ICT-Use on students, found that teacher's perception on student-practice orientation was the strongest predictor of student-impact than other factors.

However, from the results, the variables found to be not statistically and positively significant (not associated) with ICT usage were: age, household size, extension visits, level of education, income, linguistic competence, working experience,

social participation, marital status, accessibility to ICT and awareness. Also, those perceptions of the respondents not found to be statistically significant (related) to ICT usage were: availability of ICT in organization, organization policy support on ICT, organization structural support of ICT, Government policy on ICT, availability of infrastructural facilities on ICT, custom and tradition and accessibility of ICT facilities. Obviously, these variables did not have corresponding increase as ICT usage increased.

Table 8: Pearson Correlation Matrix showing the significant relationship between variables.

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}	X_{16}	X_{17}	X_{18}	X_{19}	X_{20}	X_{21}	Y
X_1	1																					
X_2	.428**	1																				
X_3	-.067	.053	1																			
X_4	.033	.188**	.012	1																		
X_5	.198**	.719	.128	.159*	1																	
X_6	-.074	.170*	.146*	.048	.016	1																
X_7	.763**	.379**	-.002	.062	.313**	-.158*	1															
X_8	.135	.170*	-.120	.027	-.146*	.013	.130	1														
X_9	.585**	.364**	-.007	.101	.170*	.630*	-.630**	.148*	1													
X_{10}	-.211**	-.139*	-.014	-.126	-.148*	.048	.229**	.232*	-.111	1												
X_{11}	.141*	.021	-.062	-.071	-.074	-.127	.103	-.030	.120	-.068	1											
X_{12}	.037	-.018	-.096	-.069	-.106	-.011	.048	-.069	.098	-.004	-.329*	1										
X_{13}	.060	-.036	-.017	-.035	-.149*	-.004	.039	.084	.118	-.009	.258*	372**	1									
X_{14}	.048	-.086	-.004	.078	-125	-.078	.038	.02 8	.037	-.076	.329*	-.381**	.372*	1								
X_{15}	.091	-.099	-.017	-.069	-.048	.015	.056	-.021	.032	-.063	.304**	-.072	.168*	.349**	1							
X_{16}	-.015	-.035	.015	-.232**	-.048	.032	-.065	-.044	.016	.086	.404**	.329**	.283**	.307**	.168*	1						
X_{17}	-.015	-.085	.005	.085	.085	-.019	.070	.084	.184*	.023	.171*	.154*	.065	.190*	.283**	.139*	1					
X_{18}	-.033	-.066	-.024	-.260**	-.260**	-.092	.061	.059	-.006	.006	.678*	-.314**	.225**	.215*	.065	.673**	.105*	1				
X_{19}	-.048	-.028	-.021	.002	.002	-.116	-.084	-.015	-.005	.048	.075	.201**	.132	-.025	.225**	.105	.213**	.162*	1			
X_{20}	-.201**	-.129	-.052	.032	.032	.169*	-.176*	-.150*	-.150*	-.189*	-.210**	-.165*	-.074	-.055	.132	-.025	.063*	-.167**	.081	1		
X_{21}	-.180*	-.078	-.081	.041	-0.006	-.148*	-.057	-.153*	.039	-.115	.026	.039	.150*	.039	.076	-.043	.069	.150*	.150*	.559**	1	
Y	-.089	-.054	-.041	.008	.108	.013	-.033	-.052	-.041	-.163*	.000	.048	.039	.157*	.039	.093	-.141*	.099	.121	.120	.320**	1

**= Correlation is significant at P=0.01 level (2-tailed)

*= Correlation is significant at P=0.05 level (2 tailed)

Legend:
X_1 = Age (in years)
X_2 = Household size (in number)
X_3 = Extension visits (in number per month)
X_4 = Level of Education (Highest Qualification)
X_5 = Income (in ₦ /k)
X_6 = Linguistic competence (No of languages)
X_7 = Working experience (in years)
X_8 = Social participation (in number of groups)
X_9 = Marital status (Married, Single)
X_{10}= Sex (Male or female)
X_{11} = Awareness of ICT (Yes, No)
X_{12} = Accessibility to ICT (Yes, No)
X_{13} = Availability of ICT in Organization (perception)
X_{14}= Organization's Policy support of ICT (perception)
X_{15}= Organization's Structure in support of ICT(perception)
X_{16}= Government Policy on ICT (perception)
X_{17}= Cost of ICT(perception)
X_{18} = Available infrastructural facilities on ICT(perception)
X_{19} = Customs and tradition (perception)
X_{20} = Accessibility of ICT facilities(perception)
X_{21} = Geographical location (perception)

Test of Hypothesis

The null hypothesis set for this study was:

H_1: "There is no significant influence of the VEA's characteristics on ICT usage".

The set hypothesis was tested by using Multiple Linear regression model.

Influence of the VEAs's Characteristics on ICT Usage

The results of the multiple linear regression analysis, as presented in Table 9, show the influence of the VEAs' characteristics on ICT usage. Two (2) of the independent variables (i.e. Accessibility to ICT(X_{12}) and Sex (X_{10}) were statistically and positively found to be significant at 5% level of probability .

Table 9: Results of multiple regression analysis showing relationship between selected independent variables and ICT usage based on the model designed for the study.

Variable	Regression co-efficients	Standard error	T-value	Significant level
(Constant)	56.619	11.778	4.807	.000
Age (X_1)	-.248	.187	-1.160	.185
Household Size(X_2)	-.014	.200	-.069	.945
Extension Visits (X_3)	-.154	.125	-1.230	.220
Level of Education (X_4)	-1.224	1.311	-.933	.352
Income (X_5)	5.999E-6	.000	2.327	.021*
Linguistic Competence (X_6)	1.595	1.881	-.848	.397
Working Experience (X_7)	.156	.848	.184	.855
Social Participation (X_8)	-1.394	.946	-1.474	.142
Marital Status (X_9)	3.655	3.589	1.018	.310
Sex (X_{10})	-8.190	3.051	-.196	.008**
Awareness of ICT (X_{11})	-.135	.326	-.413	.680
Accessibility to ICT (X_{12})	1.190	.375	3.172	.002**
Perception on Avail. of ICT in Organization (X_{13})	-1.118	1.402	-.797	.426
Perception on Organizational Policy Support (X_{14})	.101	1.136	.089	.929
Perception on Organizational Structure(X_{15})	-.286	1.962	-.146	.884
Perception on Government Policy on ICT(X_{16})	1.430	1.332	1.074	.284
Perception on Cost of ICT (X_{17})	1.353	1.263	1.071	.286
Perception on Availability of Infra. Facilities (X_{18})	.414	1.386	.298	.766
Perception on Custom &Tradition(X_{19})	-3.203	1.244	-2.574	.011*
Perception on Accessibility of ICT Facilities(X_{20})	.720	1.464	.492	.623
Perception on Geographical Location(X_{21})	1.466	1.229	1.193	.234

*= Significant at 10% level
**= Significant at 5% level
R= 0.478, R^2=0.229, R^2 - Adjusted=0.130, F Change=2.320, Durbin-Watson = 1.833.

Accessibility to ICT was found to be a factor that positively and significantly influenced ICT usage by the respondents. This implies that the more access that respondents have to ICT, the higher is the propensity for their ICT usage. Also, sex was found to be positively and significantly influenced ICT usage by the respondents. This means that the males have better usage of ICT.

These findings further buttress the results of the correlation analysis (earlier discussed) which had shown the existence of the relationship between the respondents' characteristics/perceptions and usage of ICT (i.e. Access to ICT and ICT usage, Perceptions on Government Policy and ICT usage and Perception on Customs/ tradition and ICT usage.

. Furthermore, from the results obtained from the multiple regression analysis, the following interpretations can be deducted, namely: On income (X_5) it was found to be a positively significant factor influencing ICT usage by the respondents (at P=0.10). By implication, it means the more income the respondents earn, the higher the tendency for them to utilize ICT. Also, perception on custom and tradition(X_{19}) was found to be a factor that was positively significant in influencing ICT usage by the respondents (at P=0.10). This implies that if a respondent perceives that custom and tradition tend to be suitable to usage ICT, he/she uses it. Similarly, on perception of the respondents on Custom/tradition, the results show that this variable contributes positively and significantly to ICT usage by the respondents (at P=0.10). By implication, this means that if a respondent perceive that custom/tradition tend to be suitable, he/she is likely to use ICT.

Therefore, it indicates that these variables have notable consequences in facilitating usage of ICT by the respondents. Therefore, it can be inferred that with improvement in income, and given that their attitude on custom/tradition the respondents would have favourable disposition to usage of ICT. Hence, this finding is akin to that of Oluwatayo and Ahmed (2007) who found out that both accessibility and awareness were positively related to the probability of their respondents' usage of ICT.

This finding, however, was at variance with the finding of Aderinto *et al.,* (2008) who reported that a significant relationship exists between educational level (a socio-economic characteristics) and use of ICTs. Also, the finding differ with Atajeromavwo *et al.,* (2010) who reported that the practitioners' extent of use of the available ICT facilities has not significantly influenced their perception of the importance of the facilities to their work schedule.

Generally, however, from the results in Table 9, seventeen (17) independent variables were found not to be positively and significantly influencing ICT usage. This could be attributed to the difficulties associated with measurement of perception and allocation of scores to the respondents' characteristics examined in the study. Nevertheless, it can be observed that the R^2 value is 0.229 which means, by implication, that the proportion of variation in the dependent variable that was explained by variations in independent variables was 23%. However, the relatively low percentage might be connected with the problem of measurement of variables.

The result of Durbin Watson statistics (1.838) indicates that there was no multi-collinearity found among the independent variables. Therefore, it was concluded that these variables were significantly related to ICT Usage by VEAs. Thus, the set hypothesis for the study was rejected at 5% probability level.

It can be observed that the results of the study contribute, to some measure, to the existing literature. From the findings of this study, the Social change model adopted for this study has shown the relevance of ICT as a versatile tool capable of bringing about change among the VEAs. Hence, this study has demonstrated the validity of existing theories like the theory of social change and technological change.

Specifically, for instance, the socio-psychological theories posit that activities of people bring about change in the society, and modifications in the behaviour can constitute the main role in facilitating societal development.

Above all, this finding further confirms that the hypothesis was testable and the results which indicated that there is an existence of significant relationship between VEA's socio-economic characteristics and ICT usage was evident.

5.5 The Effects of VEAs' usage of ICT on their work.

The study investigated the effects of ICT usage on the VEAs' work in order to ascertain the impact of ICT on their job performance. It was premised on the assumption that the magnitude of effect of ICT on the respondents was an indication on the importance it exerts on them and their work.

In Table 10, there is indication that the majority of the respondents agreed that ICTs have high effect on them. Consequently it was found that: (1) 96% of the respondents agreed (both Very high and Moderately high) that it was time saving; (2) 88% of the respondents agreed (both Very high and Moderately high) that it was cost saving; (3) 92% of the respondents agreed (both Very high and Moderately high) that it gives more accessibility to them; (4) 95% of the respondents agreed (both Very high and Moderately high) that it provides wider coverage; and (5) 92% of the respondents agreed (both Very high and Moderately high) that it gives more knowledge.

With these results, it can be asserted that the respondents agreed that ICT have impacted positively on them.

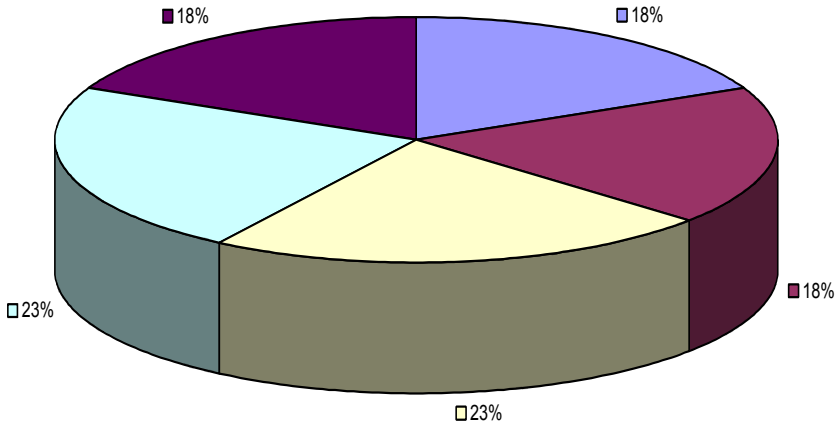
Furthermore, analysis of the overall data of the effects of ICT on the respondents (Figure 3) revealed that the proportional distributions were as follows: 23% of the respondents agreed that ICT gives wider coverage; 23% of the respondents agreed that ICT gives more accessibility; 18% of the respondents adjudged that ICT is time saving; 18% of the respondents agreed

that ICT is cost saving; and 18% of the respondents believed that ICT gives more knowledge.

This result agrees with Yahaya *et al.,* (2006) who discovered that electronic media are effective in all aspects of rural life. Similarly, it is in consonance with Otolo (2008) who found the media (being a source of information on innovations and development in agricultural sector) has positive effect as means of communication to the rural farmers.

Table 10: The distribution of the respondents according to the magnitude of ICT effects on them (n=204).

ICT attributes/effects	**Very high (%)**	**Moderately high (%)**	**High (%)**	**Low (%)**	**Very low (%)**	**Total**
It is Time saving	65.7	24.0	5.9	4.4	0.0	**100**
It is Cost saving	33.3	41.2	13.2	9.8	2.5	**100**
It gives more accessibility	41.2	34.3	16.2	3.4	4.9	**100**
It has wide coverage	56.4	24.0	14.2	2.5	2.9	**100**
It gives me more knowledge	48.0	29.4	14.2	6.4	2.0	**100**



Legend:

- Effect of ICT in time saving
- Effect of ICT in cost saving
- Effect of ICT in giving more accessibility
- Effect of ICT in providing wider coverage
- Effect of ICT in giving more knowledge

Figure 3: Pie chart showing the overall effects of ICT on the respondents

5.6 Problems encountered by VEAs in using ICT.

The study also looked into the constraints, challenges *vis-à-vis* problems encountered by the respondents in the process of using the selected ICT components. The respondents encountered a number of problems in their use of ICTs. The problems associated with each of the selected ICT components, are presented as follows:

GSM Phones

The results as shown in Table 11 indicate that thirteen (13) problems were identified by the respondents in their usage of GSM phones. First on the list was poor and lack of network/coverage/services (1^{st}). It is not unusual to find complaints of lack of network, network break down, ineffective network, interruption of the network or outright lack of or total failure or break down of coverage of telecommunication services.

Other problems (ranked 2^{nd} - 5^{th}) identified by the respondents were: insufficient money to buy air/time/recharge cards (2^{nd}); lack of electricity for charging the hand-set (3^{rd}); the high cost of purchasing it /too expensive (4^{th}); and lack of access /un-availability (5^{th}).

The foregoing findings corroborate that of Burrell (2009) who found some limitations with mobile network services including: too expensive, over-congestion and less accessible to the poor. Furthermore, it is akin to that of: Atala and Umar (2006), who in a study on the use of GSM by

journalists, identified the following problems; poor services, high charges, network problems, and difficulty in interconnectivity. Consequently, these problems present serious constraints to VEAs in utilizing ICT, in the discharge of their work and making effective agricultural extension delivery.

Table 11: Distribution of the respondents according to problems identified on their usage of **GSM Phones**, in ranking order.

S/No	Problems	Total score*	%	Ranking
1	Poor or lack of network/coverage/services	142	69.6	1
2	Insufficient money to buy air/time/recharge cards	69	33.8	2
3	Lack of electricity for charging the hand-set	54	26.5	3
4	The cost of purchasing it is high	50	24.5	4
5	Lack of access /un-availability	20	9.8	5
6	Lack of knowledge in operating it/too complicated	8	3.9	6
7	Problem of maintenance	7	3.4	7
8	Transmission of wrong messages	5	2.5	8
9	It gets spoiled	5	2.5	9
10	Lack of awareness of GSM phone	3	1.5	10
11	Problem of theft	2	1.0	11
12	Effects of radiation/insecurity	2	1.0	12

*= Multiple responses were allowed and received from the respondents

Landline (Fixed) phones

Results presented in Table 12 show that 12 problems were identified by the respondents in their usage of landline phones. On the top hierarchy of occurrence was lack of access /unavailability in the rural areas (1^{st}). This is the commonly found problem amongst phone users. It is not unusual to find complaints of lack of access to telecommunication services. Other problems with landline phones(ranked 2^{nd} -5^{th}) identified by the respondents were; lack or inefficient network (2^{nd}); it is too costly to

purchase (3rd); lack of electricity supply (4th); and immobility of service (5th).

This finding therefore is similar to that of www. Indiahometips.com (2011) which stressed the problems of landline phone which include; problem in telephone jack or wiring, bad cords and/or bad corroded modular plugs, damages caused by thunder or power surge to phones.

Consequently, these problems present serious constraints to VEAs in utilizing land-line phones as a format of ICT and making effective agricultural extension delivery.

Table 12: Distribution of the respondents according to problems identified on their usage of **Land-line phones** (Fixed), in ranking order.

S/No	Problems	Total score*	%	Ranking
1	Lack of access /unavailability in the rural areas	86	42	1
2	Lack or inefficient network	45	22.1	2
3	It is too costly to purchase/lack of fund/too expensive	39	19.1	3
4	Lack of electricity supply	17	8.3	4
5	Immobility of the service	10	4.9	5
6	It gets spoilt/malfunction	5	2.5	6
7	Problem of maintenance/repairs	4	2.0	7
8	Insufficient money to buy air/time/recharge cards/pay monthly bills	4	2.0	8
9	Lack of knowledge in operating it/too complicated	3	1.5	9
10	Lack of interest	2	1.0	10
11	Limited patronage	1	0.5	11
12	Problem of it getting stolen	1	0.5	12

*= Multiple responses were allowed and received from the respondents

Television(TV)

Results shown in Table 13 indicate that 13 problems were identified by the respondents in their usage of Television sets. First on the list was poor electricity supply. This is a problem commonly found amongst

Television set users. Other problems (ranked 2nd – 5th) identified by the respondents were; high cost (2nd); lack or poor quality of network/transmission/signal (3rd); lack of access to it /unavailability of TV (4th) and; lack of access to TV programmes (5th).

This finding therefore is similar to that of Gillwald *et al.*, (2010) who identified these as problems of watching TV namely: issues of harassment, differences in socialization, sentiment/fear, gender bias; and culture. Also, the finding corroborates to some extent the report of (www.csu.edu/science/health/ , 2011) to the effect that problems associated with T.V. were: causing real life mayhem, sedentary nature of T.V. – watching, behavior deficiency, serious health consequences and causative of obesity.

Consequently, these problems pose serious challenges to VEAs in utilizing ICT (particularly television set) and in effective performance of their work especially in getting agricultural information from the television.

Table 13: Distribution of the respondents according to problems identified on their usage of **Television**, in ranking order.

S/No	Problems	Total score*	%	Ranking
1	Lack of electricity supply	88	43	1
2	It is too costly to purchase/ too expensive	59	28.9	2
3	Lack or poor quality of network/transmission/signal	28	13.7	3
4	Lack of access /unavailability	18	8.8	4
5	Lack of access to programmes	10	4.9	5
6	Problem of maintenance	9	4.4	6
7	It gets spoilt/malfunction	8	3.9	7
8	No time to watch programmes	5	2.5	8
9	Lack of knowledge in operating television set	5	2.5	9
10	Language barrier	3	1.5	10
11	Risk on eyes due to radiation and over-exposure	1	0.5	11
12	Influence of Custom and religion	1	0.5	12
13	Problem of theft	1	0.5	13

*= Multiple response were allowed and received from the respondents

Cinema

Results in Table 14 show that 11 problems were identified by the respondents in their usage of Cinema. Topmost on the list of occurrence was lack of access to/unavailability of cinema. This is a peculiar problem faced by cinema users. Other problems (ranked 2^{nd} - 5^{th}) identified by the respondents were; Lack of electricity supply (2^{nd}); It is too costly (3^{rd}); Lack of knowledge in operating it (4^{th}); and Bad attitude cultivated through it (5^{th}). These findings agree with Lal (2007) who stated that one of the major factors inhibiting ICT diffusion and intensive utilisation is poor physical infrastructure represented by inadequate and interrupted electricity supply and communication connectivity infrastructure.

Consequently, these problems present serious constraints to VEAs in utilizing ICT generally (and cinema usage in particular) and making effective agricultural extension delivery.

Table 14: Distribution of the respondents according to problems identified on their usage of **Cinema,** in ranking order.

S/No	Problems	Total score*	%	Ranking
1	Lack of access to /unavailability of cinema	55	27	1
2	Lack of electricity supply	42	20.6	2
3	It is too costly	40	19.6	3
4	Lack of knowledge in operating it	13	6.4	4
5	Bad attitude cultivated through it	12	5.9	5
6	Lack of access to programmes	8	3.9	6
7	No time to watch programmes	7	3.4	7
8	Problem of maintenance	5	2.5	8
9	It gets spoilt/malfunction	5	2.5	8
10	Age factor	3	1.5	10
11	Language barrier	2	1.0	11

*= Multiple responses were allowed and received from the respondents

CD/DVD Player

Results presented in Table 15 show that 10 problems were identified by the respondents in their usage of CD/DVD players. The first in the ranking on the list of occurrence, according to the respondents, was lack of electricity supply. This is a peculiar problem associated with cinema users as a relatively new technology. Other problems (ranked 2^{nd} -5^{th}) identified by the respondents were the following: It is too costly to purchase (2^{nd}); Lack of access /unavailability (3^{rd}); It gets spoilt/malfunction (4^{th}); and Lack of knowledge in operating it/too complicated (5^{th}).

This agrees with Lal (2007) who stated that one of the major factors inhibiting ICT diffusion and intensive utilisation is poor physical infrastructure represented by inadequate and interrupted electricity supply and communication connectivity infrastructure. Aderinto *et al.,* (2008) also identified in their study the following as constraints to ICT usage: lack of time, remoteness of station, high access change; and low knowledge of use.

Consequently, these problems pose serious constraints to VEAs in utilizing ICT in general (and VCD/DVDs in particular), and making it difficult for their effective agricultural extension delivery.

Table 15: Distribution of the respondents according to problems identified on their usage of **CD/DVD player**, in ranking order.

S/No	Problems	Total	%	Ranking

		score*		
1	Lack of electricity supply	86	42	1
2	It is too costly to purchase/ too expensive	49	24	2
3	Lack of access /unavailability	35	17.1	3
4	It gets spoilt/malfunction	16	7.8	4
5	Lack of knowledge in operating it	14	6.7	5
6	Problem of maintenance	11	5.4	6
7	Poor quality of Video	8	3.9	7
8	Limit/lack of time to watch CD/DVD	5	2.5	8
9	Problem of it getting stolen	3	1.5	9
10	Lack of agricultural programme on CDs and DVDs	2	1.0	10

*= Multiple responses were allowed and received from the respondents

VHS video player

Results as shown in Table 16 indicate that 11 problems were identified by the respondents in their usage of VHS video players. Topmost on the order of occurrence, was lack of electricity supply. This is a peculiar problem associated with VHS video players owing to its nature. Other problems (ranked 2^{nd} - 5^{th}) identified by the respondents included; it is too costly to purchase (2^{nd}); lack of access/unavailability (3^{rd}); poor quality of video (4^{th}); and lack of knowledge of operating it/too complicated (5^{th}).

Consequently, these problems present serious constraints to VEAs in utilizing ICT, especially VHS video player, in storing and retrieving agricultural information, in the performance of their jobs and making effective agricultural extension delivery.

Table 16: Distribution of the respondents according to problems identified on their usage of **VHS Video player,** in ranking order.

S/No	Problems	Total score*	%	Ranking
1	Lack of electricity supply	71	34.8	1

2	It is too costly to purchase/ too expensive	41	20.1	2
3	Lack of access /unavailability	34	16.7	3
4	Poor quality of video	16	7.8	4
5	Lack of knowledge in operating it	10	4.9	5
6	Problem of maintenance	9	4.4	6
7	It gets spoilt/malfunction	8	3.9	7
8	Limited or no time to watch it	5	2.5	8
9	Problem of it getting stolen	4	2.0	9
10	Lack of VHS cassette on agriculture	2	1.0	10
11	Inability to buy VHS Cassette	1	0.5	11

*= Multiple responses were allowed and received from the respondents

Camera

Results as shown in Table 17 indicate that 11 problems were identified by the respondents in their usage of cameras. Topmost on the list of occurrence, was that it was too costly to purchase/too expensive. This problem associated with camera users was that the cost implication was enormous. Other problems (ranked 2nd - 5th) identified by the respondents were: lack of access /unavailability(2nd); lack of electricity/batteries (3rd); lack of knowledge in operating it/too complicated (4th) and; difficulty in processing it into photos (5th).

This finding therefore is similar to that of: Aderinto *et al.,* (2008) who identified some of the constraints associated with ICT, namely; lack of time, remoteness of station, high access change and low knowledge of use. Hence, these problems pose serious constraints to VEAs in utilizing ICT and making effective agricultural extension delivery. Indeed, with this situation they would not be able to fully maximize the benefits from camera.

Table 17: Distribution of the respondents according to problems identified on their usage of **Camera**, in ranking order.

S/No	Problems	Total score*	%	Ranking
1	It is too costly to purchase/ too expensive	48	23.5	1
2	Lack of access /unavailability	43	21.1	2
3	Lack of electricity/batteries	23	11.3	3
4	Lack of knowledge in operating it	22	10.8	4
5	Difficulty in processing it into photos	14	6.9	5
6	Problem of maintenance	11	5.4	6
7	It gets spoilt/malfunction	9	4.4	7
8	Problem of it getting stolen	6	2.9	8
9	Lack of interest	5	2.5	9
10	Poor or limited quality and performance	4	2.0	10
11	Cultivating bad or negative attitude	1	0.5	11

*= Multiple responses were allowed and received from the respondents

Computer

Results as shown in Table 18 indicate that 10 problems were identified by the respondents in their usage of computers. On the order of occurrence in the ranking, the first was that it was too costly. This is a problem associated with computer users particularly in terms of cost implication in acquiring computer. Other problems (ranked 2^{nd} - 5^{th}) identified by the respondents included: lack of access/unavailability(2^{nd}); lack of knowledge in operating it/too complicated (3^{rd}); lack of electricity (4^{th}); and problem of maintenance (5^{th}).

This finding is similar to that of Abdulsalam *et al.,* (2008) who reported that major problems identified with regards to the usage of ICTs include; poor access to ICT facilities, low sensitization on available ICTs, poor source of power supply and high cost of software and hardware. It further complies with the findings of Zainab *et al.,* (2008) who highlighted the problems and constraints with ICT components usage which include: frequent power failure and lack of alternative power supply, lack of basic knowledge of ICT utilization, system difficulties operation, inadequate finance for procurement and maintenance of ICT facilities (components),

and lack of adequate and trained staff to handle ICT facilities. Again, this finding is in agreement with Heinz (2009) who reported the shortcoming of the new XO computer developed by the One Laptop Per Child (OLPC) organization, which was rugged and useful for educational websites and database purposes but with a cost constraints (in the amount of downloaded data). Consequently, these problems present serious constraints to VEAs in utilizing ICT in general, and computers in particular, and making effective agricultural extension delivery.

Table 18: Distribution of the respondents according to problems identified on their usage of **Computer,** in ranking order.

S/No	Problems	Total score*	%	Ranking
1	It is too costly to purchase/ too expensive	75	37	1
2	Lack of access /unavailability	57	28	2
3	Lack of knowledge in operating it	51	25	3
4	Lack of electricity	44	21.6	4
5	Problem of maintenance	14	6.9	5
6	It gets spoilt/malfunction	7	3.4	6
7	Lack of awareness	5	2.5	7
8	Problem of it getting virus	3	1.5	8
9	Cause eye problems due to over-exposure	2	1.0	9
10	Lack of interest/awareness	1	0.5	10

*= Multiple responses were allowed and received from the respondents

Internet (E-mailing)

The findings shown in Table 19 indicate that 8 problems were identified by the respondents in their usage of Internet (E-mailing). The first on the list of occurrence was lack of access /unavailability. This problem is usually found among Internet browsing users and it constitute an inhibition to their usage of it. Other problems (ranked 2^{nd} - 5^{th}) identified by the respondents were as follows: lack of network (2^{nd}); it is too costly to purchase/sustain/ too expensive (3^{rd}); lack of knowledge in operating it/too complicated (4^{th}); and lack of electricity supply (5^{th}). This finding is in

consonance with Anonymous (2009) who had argued that in many cases, lack of literacy is a further impediment to the proliferation of the internet.

Consequently, these problems present serious constraints to VEAs in utilizing ICT and making effective agricultural extension delivery.

Table 19: Distribution of the respondents according to problems identified on their usage of **Internet (E-mailing),** in ranking order.

S/No	Problems	Total Score*	%	Ranking
1	Lack of access /unavailability	73	35.8	1
2	It is too costly to purchase	52	25.5	2
3	Lack of knowledge in operating it	34	16.7	3
4	Lack of electricity supply	31	15.2	4
5	Lack of network	13	6.4	5
6	Lack of awareness	7	3.4	6
7	It gets spoilt/malfunctioned	3	1.5	7
8	Lack of interest	2	1.0	8

*= Multiple responses were allowed and received from the respondents

Overhead Projector

Results presented in Table 20 shows that 8 problems were identified by the respondents in their usage of overhead projectors. The first on the list of occurrence, was lack of access/unavailability. This problem endemic with Overhead projectors as it is not easily accessible to them. Other problems (ranked 2^{nd} - 5^{th}) identified by the respondents were: It is too costly to purchase/too expensive (2^{nd}); lack of electricity supply (3^{rd}); lack of knowledge in operating it (4^{th}); and it gets spoilt (5^{th}).

This finding is similar to that of Paradi (2011) who found six common problems with computer presentation displays (including projector) namely, display toggle, cable loose, selection of the input source, turning on power, standby mode on, and projector cover loose causing harm.

To this end, these problems present serious constraints to VEAs in utilizing ICT and making effective agricultural extension delivery.

Table 20: Distribution of the respondents according to problems identified on their usage of **Overhead projector**, in ranking order.

S/No	Problems	Total score*	%	Ranking
1	Lack of access /unavailability	55	27	1
2	It is too costly to purchase/ too expensive	50	24.5	2
3	Lack of electricity supply	25	12.3	3
4	Lack of knowledge in operating it	19	9.3	4
5	It gets spoilt	11	5.4	5
6	Problem of maintenance	10	4.9	6
7	Problem of carrying it/bulkiness	6	2.9	7
8	Lack of interest/awareness	3	1.5	8

*= Multiple responses were allowed and received from the respondents

Fax

The results in Table 21 show that 8 problems were identified by the respondents in their usage of Fax machines. The first on the list of occurrence was lack of access /unavailability. This is a peculiar problem associated with Fax machine usage. Other problems (ranked 2^{nd} - 5^{th}) identified by the respondents included: It is too costly to purchase/too expensive (2^{nd}); lack of electricity supply (3^{rd}); lack of knowledge in operating it/too complicated (4^{th}); and problem of maintenance (5^{th}).

Therefore, the foregoing finding is liken to that of Anonymous (2011) who stated that despite extensive usage and gaining popularity of fax, the following problems are connected to it: security and confidentiality issues surrounding it; they are too easy to use; and the messages transmitted may be prohibitive by Government. It is noteworthy to state that these problems present serious constraints to VEAs in utilizing ICT in general, and Fax in particular, and making effective agricultural extension delivery.

Table 21: Distribution of the respondents according to problems identified on their usage of **Fax,** in ranking order.

S/No	Problems	Total score*	%	Ranking
1	Lack of access /unavailability	69	33.8	1
2	It is too costly to purchase/ too expensive	45	22.1	2
3	Lack of electricity supply	18	8.8	3
4	Lack of knowledge in operating it	15	7.4	4
5	Problem of maintenance	6	2.9	5
6	Lack of awareness/interest	6	2.9	6
7	It gets spoilt/malfunction/mis-handling	3	1.5	7
8	Lack of network	1	0.5	8

*= Multiple responses were allowed and received from the respondents

Cassette recorder

Table 22 shows that 9 problems were identified by the respondents in their usage of cassette recorders. On the top-most of the list of occurrence was lack of electricity/batteries to power it. This is a peculiar problem associated with cassette recorders' usage. Other problems (ranked 2^{nd} – 5^{th}) identified by the respondents were as follows: Problem of maintenance/mechanical failure (2^{nd}); lack of access /unavailability (3^{rd}); lack of access /unavailability (4^{th}); and lack of knowledge in operating it/too complicated (5^{th}).

This finding therefore is similar to that of: Wikipedia (2011c) who found problems of cassette recorder in the area of: lower fidelity, poor quality, limitations of the cassette's size and speed, poor quality in playing back pitch, spoilage of tapes, and the need for regular maintenance.

Hence, these problems present serious constraints to VEAs in utilizing cassette recorders and making effective agricultural extension delivery.

Table 22: Distribution of the respondents according to problems identified on their usage of **Cassette recorder**, in ranking order.

S/No	Problems	Total score*	%	Ranking
1	Lack of electricity/batteries to power it	43	21.1	1
2	Problem of maintenance/mechanical failure	34	16.7	2
3	It is too costly to purchase	26	12.8	3
4	Lack of access /unavailability	25	12.3	4
5	Lack of knowledge in operating it	15	7.4	5
6	Lack of time listen and use it	5	2.5	6
7	Lack of agricultural programme to listen to	3	1.5	7
8	Lack of interest	2	1.0	8
9	Lack of awareness	1	0.5	9
10	It can get lost or be stolen	1	0.5	10
11	Poor quality in recording	1	0.5	11

*= Multiple responses were allowed and received from the respondents

Personal Digital Assistants (PDAs)

The results in Table 23 show that 7 problems were identified by the respondents in their usage of Personal digital assistant (PDA). Topmost on the list of occurrence, according to the respondents, was lack of access/unavailability. This is a problem common because VEAs do not possess or have access to PDAs. Other problems (ranked 2^{nd} - 5^{th}) identified by the respondents were: It is too costly to purchase/too expensive (2^{nd}); lack of electricity supply (3^{rd}), lack of knowledge in operating it/too complicated (4^{th}); and lack of awareness/interest (5^{th}).

Hence, these problems present serious constraints to VEAs in utilizing ICT and making effective agricultural extension delivery especially in the discharge of their work.

Table 23: Distribution of the respondents according to problems identified on their usage of **Personal digital assistants (PDAs)**, in ranking order.

S/No	Problems	Total score*	%	Ranking
1	Lack of access /unavailability	53	26	1
2	It is too costly to purchase/ too expensive	30	14.7	2
3	Lack of electricity supply	16	7.8	3
4	Lack of knowledge in operating it	15	7.4	4
5	Lack of awareness/interest	14	6.9	5
6	It gets spoilt/malfunction	9	4.4	6
7	Problem of it getting stolen or lost	1	0.5	7

*= Multiple responses were allowed and received from the respondents

Radio

Results in Table 24 show that 11 problems were identified by the respondents in their usage of radio sets. Topmost on the list of occurrence was lack of electricity or batteries to power it. This is a peculiar problem associated with radio set usage. Other problems (ranked 2^{nd} - 5^{th}) identified by the respondents were the following: It is too costly to purchase (2^{nd}); lack of access/unavailability (3^{rd}); problem of maintenance (4^{th}); and lack of reception of transmission (5^{th}).

The foregoing finding is in consonance with Gillwald *et al.,* (2010) who found that usage of radio was constrained by: lack of access; lack of money; inability to repair it; lack of knowledge on how to operate it; not able to select which programmes to listen to; and periodic expenses of buying new batteries.

Therefore, these problems present some constraints to VEAs in fully utilizing radio and making effective agricultural extension delivery.

Table 24: Distribution of the respondents according to problems identified on their usage of **Radio**, in ranking order**.**

S/No	Problems	Total score*	%	Ranking
1	Lack of electricity or batteries to power it	52	25.5	1
2	It is too costly to purchase	28	13.7	2
3	Lack of access /unavailability	18	8.8	3
4	Problem of maintenance	13	6.4	4
5	Lack of reception of transmission	11	5.4	5
6	Lack of time to listen to programme	10	4.9	6
7	Lack of feed-back mechanism	9	4.4	7
8	Wrong timing of airing programme	8	3.9	8
9	It gets spoil/malfunction	5	2.5	9
10	Lack of knowledge in operating it	3	1.5	10
11	Lack of interest	1	0.5	11

*= Multiple responses were allowed and received from the respondents.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

The following are the summary, conclusions and recommendations emanating from this study:

6.1 Summary

The level of awareness of ICTs among the respondents (VEAs) was quite high especially on radio radio (99%), GSM phones (96%); and television (93%). On the contrary, the level of awareness was low on fax (68%) and Personal Digital Assistant (PDAs) (69%).

The study also discovered that the following ICT devices were mostly accessible to the respondents: 98% of the respondents had access to Radio, 96% of them had access to GSM phones and; 85% had access to television set. Inversely, the least accessible ICT components were; fax (91%), overhead projector (81%) and PDAs (81%).

It was also noted that the following devices were highly used by the respondents; GSM phones, radio, cassette recorder, television, CD/DVD player and VHS Video player. Unfortunately, the respondents recorded least ICT usage on fax and PDAs.

Results of Pearson Correlation (r) analysis of association between the independent variables i.e. between: access to ICT and ICT usage; perceptions on government policy and ICT usage; and perception on customs/ tradition and ICT usage - which indicate that they synchronized positively.

From the results of Multiple regression analysis, the variables with the highest influence on ICT Usage by the respondents were: income (0.039*), Sex (0.007**), Accessibility to ICT (0.000***) and Perception on

custom/tradition (0.021*) and Perception on Availability of Infrastructural Facilities (0.047*). These variables were positively and statistically significant.

Furthermore, the findings revealed that the majority of the respondents highly agreed that ICT has effect on them in terms of: (1) time saving (89%); (2) cost saving (75%); (3) more accessibility (76%); (4) wide coverage (80%); and (5) more knowledge (77%).

However, the study found some constraints and problems that the respondents had in using ICT. Prominent among them were: poor and lack of network/services, lack of electricity, the cost of purchasing it was too expensive, lack of access/un-availability, lack of money to buy air time/or recharge cards, lack of maintenance, inability to operate it and lack of awareness.

6.2 Conclusion

Based on the findings from the study, it was concluded as follows: The level of awareness of VEAs on some ICT components selected for this study was high on the following; radio, GSM phones, television, cinema, CD/DVD players, cassette recorders, VHS video players, camera and computer. This implies that the respondents were highly aware of these ICT components. The level of accessibility of the respondents to ICT was found to be high on some ICT devices namely; camera, cassette recorder, GSM phones, television, CD/DVD players and radio. This indicates the VEAs had some considerable opportunity to use them. The extent of Usage of ICT by the respondents in their work was remarkably high on the following devices; GSM phones, radio, cassette recorder, television, CD/DVD player and VHS video player. Furthermore, the study has demonstrated that significant relationship exists between the respondents' socio-economic characteristics and ICT usage. Thus, it was found that income, accessibility to ICT, sex, and perceptions on custom/ tradition

and availability of ICT were found to be factors that significantly and positively influenced ICT usage by the respondents. The study indicated positive effects of ICT on the respondents in terms of: time and cost savings; more accessibility; wide coverage; and more knowledge. Furthermore, numerous problems were found to have constituted hindrances toward ICT usage by the respondents, the most important ones being: lack of access/unavailability in the rural areas; lack of network/ services; lack of money to buy air time/or recharge cards; the cost of purchasing it was high; it is too complicated; lack of electricity; and it gets spoiled.

6.3 Recommendations

The following recommendations are derived from the study;

- ✓ The ICT components to which the respondents have low level of awareness were: overhead projector, land line phones, fax and internet (E-mailing). Therefore, it is recommended that these ICT components should be popularized among VEAs through awareness drive, organizing trainings and workshops.
- ✓ The level of accessibility of the respondents to ICT was found to be low, and the least accessible ICT components were: fax (91% of respondents); overhead projector (81% of respondents); and PDAs (81% of respondents). Hence, it is recommended that these ICT components be made more accessible to VEAs by their employers and the governments so as to enhance their usage.
- ✓ On the extent of usage of ICT by the respondents for their work, they recorded least ICT usage on fax and pocket PDAs and cinema. It is recommended therefore that fax, cinema and PDAs should be encouraged for use more frequently by the ADPs in order to bring more awareness and accessibility of them to VEAs.
- ✓ The study found that strong positive relationships exist between some socio-economic characteristics/perceptions of the respondents

and their ICT usage. To this end, efforts should be made toward sustaining this development.

- ✓ The respondents acknowledged the positive effects of ICT. Therefore, it is imperative that these benefits should be sustained and continued by the VEAs by ensuring their continued usage of ICT components.
- ✓ Some problems were found to be impeding on the usage of ICT by the respondents such as: lack of access/unavailability in the rural areas; lack of network and services; and the cost of purchasing it was high. Therefore, it is recommended that ICT suppliers, dealers and telecommunication/communication providers should be mobilized toward making the ICT devices and facilities readily available and accessible in rural areas, in order to optimize their usage.

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APPENDICES

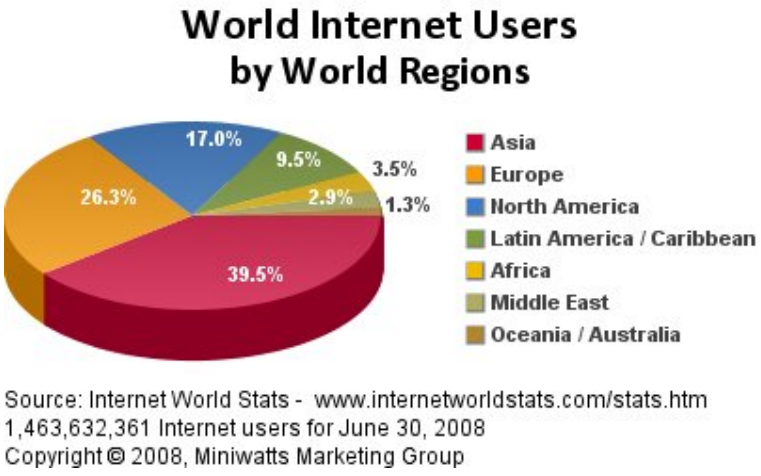
Appendix 1: Top country markets by levels of radio ownership in Africa.

Rank	Country	Population	Radios owned	Percentage of population owning radios
1	**Nigeria**	**135,031,164**	**27,006,233**	**20%**
2	**DRC**	**65,751,512**	**24,985,575**	**38%**
3	**Sudan**	**39,379,358**	**18,153,884**	**46%**
4	**South Africa**	**43,997,828**	**10,911,461**	**21%**
5	**Tanzania**	**39,379,358**	**16,462,609**	**41%**
6	**Kenya**	**36,913,721**	**8,047,191**	**21%**
7	**Uganda**	**30,262,610**	**4,932,805**	**16%**
8	**Ghana**	**22,931,299**	**4,586,260**	**19%**

9	**Zimbabwe**	**12,311,143**	**4,035,000**	**32%**
10	**Mozambique**	**20,905,585**	**3,135,838**	**14%**
11	**Cote d'Ivoire**	**18,013,409**	**2,629,958**	**14%**
12	**Togo**	**8,078,314**	**2,326,896**	**41%**
13	**Cameroon**	**18,060,383**	**2,311,729**	**12%**
14	**Benin**	**8,078,314**	**2,164,988**	**26%**
15	**Zambia**	**11,477,447**	**1,698,662**	**15%**

Source: Balancing Act, 2008 projections in (Mayers, 2008).

Appendix 2: Statistics of Internet Usage by World region (2008).



Source: www.internetworldstats.com/

Appendix 3: Cell phone usage worldwide, and Nigeria taking 24th position among the first 30 out of 222 countries sampled.

Rank	Country	Cell phones	Date of information
1.	**China**	**547,286,000**	**2007**
2.	**European Union**	**466,000,000**	**2005**
3.	India	362,300,000	2009
4.	United States	255,000,000	2007
5.	Russia	170,000,000	2007
6.	Brazil	120,980,000	2007
7.	Japan	107,339,000	2007
8.	Germany	97,151,000	2007
9.	Pakistan	88,020,000	2008
10.	Indonesia	81,835,000	2008
11.	Italy	78,571,000	2006
12.	United Kingdom	71,992,000	2007
13.	Mexico	68,254,000	2007
14.	Turkey	61,976,000	2007
15.	France	56,719,000	2007
16.	Ukraine	55,240,000	2007
17.	Philippines	51,795,000	2007
18.	Spain	41,328,000	2005
19.	Spain	48,813,000	2007
20.	Korea, South	43,500,000	2007
21.	South Africa	42,300,000	2007
22.	Poland	41,389,000	2007
23.	Argentina	40,402,000	2007
24.	Nigeria	40,395,000	2007
25.	Bangladesh	34,370,000	2007
26.	Colombia	33,941,000	2007
27.	Vietnam	33,200,000	2007
28.	Egypt	30,065,000	2007

29.	Iran	29,770,000	2007
30.	Saudi Arabia	28,381,000	2007

Source: www.infoplease.com/

Appendix 4: Kebbi State ADP, the Zones and Local Government Areas covered

S/NO	Zone	Zonal Headquarters	Local Government Areas
1	I	Arugungu	Arugungu, Arewa, Augie, Aliero, Jega, Birnin-Kebbi, and Gwandu
2	II	Bunza	Bunza, Bagudo, Dandi, Maiyama, Kalgo, Koko/Besse and Suru
3	III	Zuru	Zuru, Danko/Wasagu, Sakaba and Fakai
4	IV	Yauri	Yauri, Shanga and Ngasku.

Source: Field Survey, 2010

Appendix 5: Kaduna State ADP, the Zones and Local Government Areas covered.

S/NO	Zone	Local Government Areas
1	Birnin Gwari	Chikun, Kajuru, Birnin Gwari, Kaduna South, Kaduna North
2	Maigana	Zaria, Sabon-Gari, Kudan, Makarfi, Soba, Ikara, Giwa, Kubau
3	Lere	Lere, Igabi, Kauru
4	Samaru-Kataf	Kachia, Kagarko, Jaba, Jema'a, Kaura, Sanga, Zango-Kataf

Source: Field Survey, 2010.

Appendix 6: Kano State ADP, the Zones and Local Government Areas covered

S/NO	Zone	Local Government Areas
1	Zone I Rano	Rano, Babeji, Bunkure, Doguwa, Garko, Garun Mallam,

		Gwazo, Kabo, Karaye, Kibiye, Kiru, Kunbotso, Kura, Maidibo, Sunmaila, Tudun-Wada,
2	Zone II Danbatta	Danbatta, Bagwai, Bichin, Danwakin Tofa, Gezewa, Kuchin, Makoda, Minjibir, Rimi, Gado, Shanono, Tofa, Tsanyawa, Ungogo
3	Zone III Gaya	Gaya, Ajingi, Albasu, Dala, Dawakin-Kudu, Fagge, Gabasawa, Gwale, Kano, Nassarawa, Takai, Tarauni, Wurawa, Wudil

Source: Field survey, 2010

Appendix 7: Results of regression analysis showing relationship between selected independent variables and ICT usage based on the model designed for the study.

Variable	Regression co-efficients	Standard error	T-value	Significant level
(Constant)	56.619	11.778	4.807	.000
Age (X_1)	-.248	.187	-1.160	.185
Household Size(X_2)	-.014	.200	-.069	.945
Extension Visits (X_3)	-.154	.125	-1.230	.220
Level of Education (X_4)	-1.224	1.311	-.933	.352
Income (X_5)	5.999E-6	.000	2.327	.021*
Linguistic Competence (X_6)	1.595	1.881	-.848	.397
Working Experience (X_7)	.156	.848	.184	.855
Social Participation (X_8)	-1.394	.946	-1.474	.142
Marital Status (X_9)	3.655	3.589	1.018	.310
Sex (X_{10})	-8.190	3.051	-.196	.008**
Awareness of ICT (X_{11})	-.135	.326	-.413	.680
Accessibility to ICT (X_{12})	1.190	.375	3.172	.002**
Perception on Availability of ICT in Organization (X_{13})	-1.118	1.402	-.797	.426
Perception on Organizational Policy(X_{14})	.101	1.136	.089	.929
Perception on Organizational Structure(X_{15})	-.286	1.962	-.146	.884
Perception on Government Policy on ICT(X_{16})	1.430	1.332	1.074	.284
Perception on Cost of ICT (X_{17})	1.353	1.263	1.071	.286
Perception on Availability of Infrastructural Facilities (X_{18})	.414	1.386	.298	.766
Perception on Custom &Tradition(X_{19})	-3.203	1.244	-2.574	.011*
Perception on Accessibility of ICT Facilities(X_{20})	.720	1.464	.492	.623
Perception on Geographical Location(X_{21})	1.466	1.229	1.193	.234

*= Significant at 10% level
**= Significant at 5% level

R= 0.478, R^2=0.229, R^2 - Adjusted=0.130, F Change=2.320, Durbin-Watson = 1.833.

Appendix 8: QUESTIONNIARE

TOPIC: SOCIO-ECONOMIC, ORGANIZATIONAL AND ENVIRONMENTAL FACTORS INFLUENCING USAGE OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT) BY VILLAGE EXTENSION AGENTS (VEAs) IN THREE SELECTED STATES OF NIGERIA

RESPONDENTS: VILLAGE EXTENSION AGENTS (VEAs)

RESPONDENT'S IDENTITY:

1. Your Name (Optional): …….. NO: …
   ……
2. ADP Zone:……
3. State:…….....
4. GSM No (Optional)…….

SECTION A: FACTORS INFLUENCING USAGE OF ICT BY VEA

AI. SOCIO-ECONOMIC CHARACTERISTICS OF VEA:

5. Sex: Male ( ) Female ( )
6. Age:……..
7. Marital Status: Single ( ) Married ( ) Divorced ( )
8. Household Size (in Numbers): ( )

Level of Education:

9. What is your highest level of education?

a. No formal Education ( )
b. Quranic Education ( )
c. Primary School ( )
d. Adult Education ( )
e. Secondary School ( )
f. OND ( )
g. HND ( )
h. B.SC. ( )
i. M. Sc./Ph. D ( )

10. What is the number of years you spent in formal school?
……Years

Working Experience:

11. How long have you been working as an extension agent? Please be specific.

a. < 2 years ( )
b. 3 – 6 years ( )
c. 7- 10 years ( )
d. 11 – 14 years ( )
e. 15 – 18 years ( )
f. 19 years and above ( )

Housing:

12. What type of accommodation/housing do you have?

a. Squatting ( )

b. Rented ( )
c. Family house ( )
d. Self-built ( )

Income:

13. Give estimates of your annual income for the past two years (2008 and 2009):

Year	INCOME ₦: K
2008	
2009	

So**urce(s) of income**:

14. What are your sources of income?
a. Salary ( )
b. Farming ( )
c. Trading ( )
d. Hired labour ( )
e. Others (please specify (…….)

Location/Place of Residence

15. Where are you living?
(a) Village ( )
(b) Semi urban area ( )
(c) Urban area (city) ( )

Membership of organizations.

16. How many organizations/groups do you belong to? ( )

17. Please specify, give name of the group/organization:
……..
…….....

Extension visits

18. On the average, how many extension visits do you make to your farmers in a month?
…….

Linguistic competence:

19. Which languages do you speak fluently?
a)……
b)……
c)…….

AII. VEA's PERCEPTIONS OF ORGANIZATIONAL CHARACTERISTICS IN RELATION TO ICT:

Please give your views pertaining to ICTs in your organization

a. POSSESSION OF ICT BY YOUR ORGANIZATION

	Adequate (3)	Unsure (2)	Inadequate (1)
20. How adequate is your Organization's possession of ICT in enhancing your usage of it?			

b. AVAILABILITY OF ICT BY YOUR ORGANIZATION

	Adequate (3)	**Unsure (2)**	**Inadequate (1)**
21. How adequate is making available ICT components by your Organization in enhancing your usage of it?			

c. ORGANIZATION's POLICY

	Supportive (3)	**Unsure (2)**	**Not supportive (1)**
22. How supportive is your Organization's policy on ICT in enhancing your usage of it?			

d. ORGANIZATION's STRUCTURE

	Supportive (3)	**Unsure (2)**	**Not supportive (1)**
23. How supportive is your Organization's structure on ICT in enhancing your usage of it?			

III. VEA's PERCEPTIONS ON ENVIRONMENTAL CHARACTERISTICS IN RELATION TO ICT

Please give your views pertaining to issues on ICT environment?

a. AVAILABILITY OF INFRASTRUCTURE

	Adequate (3)	**Unsure (2)**	**Inadequate (1)**
24. How adequate is availability of infrastructure in enhancing your ICT usage?			

b. ACCESSIBILITY OF ICT

	Adequate (3)	**Unsure (2)**	**Inadequate (1)**
25. How adequate is accessibility to ICT in facilitating your usage of it?			

c. GOVERNMENT's POLICY

	Favourable (3)	**Unsure (2)**	**Unfavourable (1)**
26. How favourable is Government's Policy support in enhancing your ICT usage?			

d. COST OF ICT

	Relevant (3)	**Unsure (2)**	**Not relevant (1)**
27. How relevant is the cost of ICT components in enhancing your ICT usage?			

e. **CUSTOM AND TRADITION**

	Favourable (3)	**Unsure (2)**	**Unfavourable (1)**
28. How favourable is Custom and tradition in enhancing your ICT usage?			

f. **GEOGRAPHICAL LOCATION**

	Relevant (3)	**Unsure (2)**	**Not relevant (1)**
29. How relevant is remoteness of your geographical location in enhancing your ICT usage?			

SECTION B: LEVEL OF AWARENESS/ACCESSIBILITY AND POSSESSION:

30. Which of the following ICTs are you aware of? (Please tick (✓) as applicable to you).

ICT components	**Aware**	**Not aware**
a. GSM phones		
b. Land line phone		
c. Television set		
d. Cinema		
e. CD/DVD player		
f. VHS Video player		
g. Camera		
h. Internet (e-mailing)		
i. Computer		
j. Overhead projector		
k. Fax		
l. Cassette recorder		
m. Pocket devices (PDAs)		
n. Radio		

31. Which of the following ICT do you have access to? (Please tick (✓) as applicable to you).

ICT components	**Have access**	**Do not have access**
a. GSM phones		
b. Land line phone		
c. Television set		
d. Cinema		
e. CD/DVD player		
f. VHS Video player		
g. Camera		
h. Internet (e-mailing)		
i. Computer		
j. Overhead projector		
k. Fax		
l. Cassette recorder		
m. Pocket devices (PDAs)		
n. Radio		

32. Which of the following ICT do you possess?
(Please indicate (✓) as applicable to you).

ICT components	Yes	No
a. GSM phones		
b. Land line phone		
c. Television set		
d. Cinema		
e. CD/DVD player		
f. VHS Video player		
g. Camera		
h. Internet (e-mailing)		
i. Computer		
j. Overhead projector		
k. Fax		
l. Cassette recorder		
m. Pocket devices (PDAs)		
n. Radio		

33. Which of the following ICT can you personally acquire? (Please tick (✓) as applicable to you).

ICT components	Yes	No
a. GSM phones		
b. Land line phone		
c. Television set		
d. Cinema		
e. CD/DVD player		
f. VHS Video player		
g. Camera		
h. Internet (e-mailing)		
i. Computer		
j. Overhead projector		
k. Fax		
l. Cassette recorder		
m. Pocket devices (PDAs)		
n. Radio		

SECTION C: USAGE OF ICT

34. How often do you use any of the following ICT components for your work?

ICT Components	Very often (4)	Often (3)	Rarely (2)	Not at all (1)
a. GSM phones				
b. Land line phone				
c. Television set				
d. Cinema				
e. CD/DVD player				
f. VHS Video player				
g. Camera				
h. Internet (e-mailing)				
i. Computer				
j. Overhead projector				

k. Fax				
l. Cassette recorder				
m. Pocket devices (PDAs)				
n. Radio				

35. Which of the following issues do you consider enhance your usage of ICT ?

Issues on ICT usage	**YES**	**NO**
a. Access to ICT		
b. Awareness of ICT		
c. Cost of ICT		
d. Religion		
e. Custom		
f. Literacy		
g. Age		
h. Language		

36. If your response to Question 35 is Yes, to what extent does these issues enhance your usage of ICT?

Note: Great extent=GE, Moderate extent=ME, Undecided=U, Some extent=SE, No extent=NE

Issues on ICT usage	**GE (5)**	**ME (4)**	**U(3)**	**SE(2)**	**NE (1)**
a. Access to ICT					
b. Awareness of ICT					
c. Cost of ICT					
d. Religion					
e. Custom					
f. Literacy					
g. Age					
h. Language					

37. How often do you perform any of the following functions?

Functions	**GSM**	**Land Phones**	**TV**	**Cinema**	**CD/DVD**	**VHS**	**Camera**	**E-mailing**	**Compute**	**OVerhead Projector**	**Fax**	**Casette recorder**	**PDAs**	**Radio**
a. Conduct field visits														
b. Contacting/ hold meetings with farmers														
c. Teach farmers recommendations														
d. Attend trainings organized by SMSs/AEOs														
e. Attend technical meetings														
f. Organize field days														
g. Report field problems														
h. Official work in the Headquarters														
i. Establishment of OFAR trials														
J. Formation/registration of farmers groups														
k. Establishment of MTP/FNT														

38. Which of the following ICT components do you use for the following functions?

(Please tick (✓) as applicable).

39. In making contacts with farmers, which of these methods do you use?

a. Personal contact ( )
b. Fellow farmers ( )
c. GSM phones ( )
d. Village heads ( )
e. Wall sign ( )
f. Land line phone ( )
g. Town crier ( )
h. Any other: (Please specify)…….

SECTION D: ICT USERS' EFFECTS

40. Do you think ICT has positive effect(s) on you?

a) Yes ( ) b No ( )

41. In your view, which of the following effects do you consider ICT have on you?

ICT attributes	**Very high (5)**	**Moderately high (4)**	**High (3)**	**Low (2)**	**Very low (1)**
a. It is Time saving					
b. It is Cost saving					
c. It gives more accessibility					
d. It has wide coverage					
e. It gives me more knowledge					

42. To what extent do you consider ICT effect has on your job?

ICT effects	**Very high (5)**	**Moderately high (4)**	**High (3)**	**Low (2)**	**Very low (1)**

Functions	**Very often (5)**	**Often (4)**	**Rarely (3)**	**Unsure (2)**	**Not at all (1)**
a. Conduct field visits					
b. Contacting/ hold meetings with farmers					
c. Teach farmers recommendations					
d. Attend trainings organized by SMSs/AEOs					
e. Attend technical meetings					
f. Organize field days					
g. Report field problems					
h. Attend to work in the Headquarters					
i. Establishment of OFAR trials					
J. Formation/registration of farmers groups					
k. Establishment of MTP/FNT					

a. ICT enhances my job performance					
b. ICT enhances my communication					
c. ICT give me more contacts					
d. ICT enables me to have wide coverage					
e. ICT gives me more knowledge					

SECTION E: BENEFITS OF ICT USAGE

43. Which of the following benefits have you derived from ICT usage? (Please tick (✓) as applicable to you).

S/No	**Benefits**	Tick here
A	Getting extension information	
B	Making contacts	
C	Recording agricultural information /extension messages	
D	Taking of agricultural photos with camera	
E	Viewing of agricultural programme in cinema/VCD/video player	
F	Reporting problems on farming activities	
G	Getting advise on agricultural problems	
H	Getting information on Government and policies	
I	Getting information on agricultural technologies	
J	Getting market information	
K	Reduction of transaction costs on inputs and sale of produce	
L	Getting information on management of pests and diseases	
M	Sending and receiving early warnings/alarms	
N	Getting information on agricultural development	

44**.** In your view, what other benefits do you consider the **Extension agents** derived from usage of ICT?
(Please list them).
1.…….
2……..
3……..

45. In your view, what benefits do you consider **the farmers** derive from your usage of ICT?
(Please list them).
1.…….
2……..
3……..

46. How effective has ICT been in the following **extension teaching methods** for you?

Extension teaching methods	**Most effective (4)**	**Effective (3)**	**Unsure (2)**	**Ineffective (1)**
a. Discussion method				
b. Demonstration method				
b. Exhibition				
c. Problem solving method				
d. Project method				
e. Dramatized method				
f. Individual contact method				
g. Mass media method				

47. Which of the following communication method would you prefer to use?
(a) ICT only ( )
(b) Personal communication only ( )
(c) Both ( )

48. Please give reasons for your choice (on Question 47) as follows

a) ICT only

1.
…….
2.……
….
3.……

b) Personal communication only

1.
…….
2.……
….
3.……

c) Both ICT and Personal communication

1.
…….
2.……
….
3.……

SECTION F: PROBLEMS OF ICT USAGE

49. Please list some of the major problems limiting your usage of each of these ICT components?

ICT components	**Problems**
a. GSM Phones	
	1……..
	2……..
	3…….
b. Land line phones	
	1……..
	2……..
	3…….
c. Television set	
	1……..
	2……..
	3…….
d. Cinema	
	1……..
	2……..
	3…….
e. CD/DVD Player	
	1……..

2……..

3…….

f. VHS Video player

1……..

2……..

3…….

g. Camera

1……..

2……..

3…….

h. Internet (E-mailing)

1……..

2……..

3…….

i. Computer

1……..

2……..

3…….

j. Overhead Projector

1……..

2……..

3…….

k. Fax

1……..

2……..

3…….

L. Cassette Recorder

1……..

2……..

3…….

m. Pocket devices (PDAs)

1……..

2……..

3…….

n. Radio

1……..

2……..

3…….

50. Please give suggestions on how the problems could be solved?

1.…….

2……..

3……..

SECTION G: GENERAL INFORMATION

51. Please give suggestions, if any, toward realizing development in the rural areas:

1. ……
2. ……
3. ……
4. ……

52. In general, please give your view (in a sentence) on ICT

……
……..
……
…….
……

I THANK YOU IMMENSELY FOR YOUR PATIENCE AND COOPERATION.

Sincerely,

T. O. FADIJI