Summer 1-28-2017

Perceived Effects of Use of Information and Communication Technologies (ICTs) on Rural Farmers' Knowledge in Orlu Agricultural Zone, Imo State.

Tijjani Abu Rimi Mr
Federal University, Dutsinma, Katsina State, symeonjachin@gmail.com

Anaeto Francis Chudi Dr
Federal University of Technology, Owerri, symeonjachin@gmail.com

Emerhirhi Emily Emily Mrs
Federal College of Education Technical Omoku, Rivers State ,Nigeria, symeonjachin@gmail.com

Perceived Effects of Use of Information and Communication Technologies (ICTs) on Rural Farmers' Knowledge in Orlu Agricultural Zone, Imo State.

[1]Tijjani, A.R., [2]Anaeto, F.C., and [3]Emerhirhi, E. [1]Dept. of Agricultural Economics & Extension, Federal University, Dutsinma, Katsina State, Nigeria; [2]Dept. of Agricultural Extension, Federal University of Technology, Owerri, Imo State; [3]Dept. of Agricultural Education, Federal College of Education (Technical), Omoku, Rivers State.
Email : symeonjachin@gmail.com

Abstract

The aim of this study was to ascertain the effects of use of Information and Communication Technologies (ICTs) on farmers' knowledge in Orlu Agricultural Zone, Imo State. Data were collected with structured questionnaires distributed to 130 respondents randomly selected from the 10 extension blocks in Orlu Agricultural Zone. Data collected were analyzed descriptively. The result obtained showed that, radio is the most readily available ICT device (99.2%), followed by mobile phone (97.7%). It was also observed that ICT use have effects on the farmers' knowledge on improve use of equipment with a mean response of 2.93, increase knowledge of use and management of water (M= 2.86), increase knowledge of use of improved seeds (M=3.25), increase of use of fertilizer and pesticides with mean responses of 3.18 and 2.97 respectively among others. This study thus recommended that Government should provide financial support to farmers through the provision of interest free loans to enable them acquire and use the technologies.

Key words – ICTs, rural, knowledge, farmers, agriculture,

Introduction

Knowledge management can play a pivotal role in enhancing agricultural productivity and addressing the problem of food insecurity. If properly managed, it enables appropriate knowledge and information to reach knowledge intermediaries and smallholder farmers in a timely manner. Such delivery of knowledge and information undoubtedly minimizes the risk and uncertainty smallholder farmers face from production to marketing of their produce (UNDP, 2012). But to effectively engage in agricultural knowledge management, adequate mechanisms are needed for generating, capturing, and disseminating knowledge and information through the use of effective processes and institutional arrangements.

Sources of agricultural knowledge include scientific research and indigenous knowledge. After the creation, sourcing or accumulation of knowledge, the knowledge has to be disseminated to users to support the innovation process. Information and communication technology (ICT) can play a critical role in facilitating rapid, efficient, and cost effective knowledge management. This means that communication plays an important role in the agricultural sector. According to (Plantwise in UNDP, 2012), technological innovation is becoming increasingly important in agricultural development and productivity. Mobile ICTs (information and communication technologies) are one such innovation and provide a more efficient and cost-effective method for sharing and exchanging knowledge more widely. ICTs provide farmers with access to important information, such as pest and disease reports, weather conditions, and market prices, and can also improve communication between farmers and extensions workers who are unable to visit farmers as often as both parties would like. Enhancing communication between farmers, extension workers, researchers, and policy makers is essential to the improvement of agricultural efficiency.

Knowledge management can be defined as the fact or condition of knowing something with a considerable degree of familiarity acquired through experience, association or contact. Knowledge consists of the attitudes, cumulative experiences, and developed skills that enable a person to consistently, systematically and effectively perform a function (UNDP, 2012). It is an integration of explicit and tacit knowledge. Explicit knowledge refers to all aspects of formal, systematic, recorded, communicated and shared knowledge that is made accessible through a variety of information delivery systems. Tacit knowledge on the other hand is highly personal, created by doing, trial, error, reflection and revision.

Knowledge management encompasses processes and practices concerned with the creation, acquisition, sharing and use of knowledge, skills and expertise and follow a circular flow and a nonstop process that continuously updates itself. Knowledge management deals with the process of capturing, sharing and using of knowledge and techniques .For the circular flow of knowledge management to take place both knowledge, that is sufficiently better than the existing knowledge, and means for transmitting it must be both available. In addition, the consumers of knowledge must be willing and able to use the better knowledge that is now available.

Knowledge is considered as the fourth production factor after labor, land and capital (AFAAS, 2011) and is particularly critical in the agricultural sector. Making relevant knowledge accessible to the farming community helps improve production, productivity and brings higher returns. If the agricultural practice of smallholders is not backed up by modern agricultural knowledge and information, agricultural households are likely to remain trapped in low productivity, food insecurity. This is because agriculture is the mainstay of the Nigerian economy and underpins its development process. It is a sector with great potential for stimulating growth and employment and eradicating poverty. Because of its importance to

national food security and poverty reduction, the government has, within the Growth and Transformation Plan Agenda (GTP), articulated a clear vision for the sector, placing it at the center aim to stimulate investment and productivity

Information and communication technologies (ICTs) play inevitable roles in every aspect of human activities today, including agriculture. The key players in agriculture are the farmers, and their ability to use the technologies defines the role of ICT in agriculture generally (Nwagwu and Opeyemi, 2015). ICT use by farmers is now on the increase globally. In increasing access and exchanging of information, ICT offer the potential to increase efficiency, productivity, competitiveness and growth in various aspects of agricultural sector. Farmers that engage in commercial agriculture in large scale might be expected to be using cameras, computing devices, digital imaging, the Internet and Wide Area Networking (WAN), Wi-Fi, SMS services, WAP (Wireless Access Protocol) based internet access using cellular telephony, and digital media and DVD, among others (Nwagwu and Opeyemi,2015). Those that engage in agriculture in small scale utilize various other forms of ICT such as mobile phones, computers, and the internet etc.

Given that the future of food depends to such a great extent on small-scale agriculture, governments and development partners are focusing on how to increase productivity in sustainable ways through new technologies that smallholders can use. Irrigation management, biotechnologies, pest management and eradication, soil assessment, improved nutrient and land management, improved market access, and innovative storage facilities are all strategies for increasing smallholders' agricultural productivity and improving their access to markets, but the challenge lies in ensuring that smallholders can obtain and use them. ICT provides an incredible opportunity to reach farmers with the technical information they require to increase yields. Therefore, in the study area, the information on effects of use of ICTs on farmers' knowledge, is

yet to be established and this is why this study was carried out. The main objective of this study was to determine the effects of use of Information and Communication Technologies (ICTs) on farmers' knowledge in Imo State, Nigeria. The specific objectives of this study includes to:

i. describe the socio-economic characteristics of the farmers in the study area;
ii. identify ICT devices available to the farmers;
iii. determine the perceived effects of use of ICTs on rural farmers' knowledge.

Methodology

The study was carried out in Orlu Agricultural zone of Imo state. The state is in South-east Nigeria. Imo state is divided into three (3) senatorial districts of Owerri, Orlu and Okigwe politically and demarcated along three Agricultural Zones namely; Okigwe, Owerri and Orlu (ADP, 2003). The state is made up of twenty-seven (27) Local Government Areas (LGAs) and its capital is Owerri. Orlu Agricultural Zone is made up of eleven (11) LGAs. Imo state lies within latitudes $4^0$45N and $7^0$15N and longitudes $6^0$50^{0}N and $7^0$25^{0}E with an area of around 5,100sq/km. It is bordered by Abia State on the East, by the River Niger and Delta State on the West, by Anambra State to the North, and River State to the South (IMSG, 2001). The estimated population of Imo State as of 2016 was 4.8million and the population density varies from 230-1,400 people per square kilometer (NPC, 2006). It lies within the tropical rain and evergreen forest with a tropical climate that is humid all year round. The rainy season spans from March to October and is bimodal with a two-week break in rainfall in August (August break). The main annual rainfall in the state is 20,00m while the annual temperature is between 25^0C and 28^0C with relative humidity of about 98% during the raining season and between 50% and 60% during dry season. The major arable crops grown

are cassava, yam, plantain/banana, maize, melon, sweet potato and vegetables such as okra, pepper, tomato and *telfairia* (ADP, 2010). Orlu agricultural zone has 10 Extension blocks and 107 extension circles manned by extension agents. All ICT user farmers in the zone constitutes the population of the study. A list of all registered ICT user farmers in the zone was obtained from ADP office in the zonal headquarters. The list has a total number of 1,300 ICT user farmers and 10% of the total number was randomly selected which gave a total sample size of 130 ICT user farmers**.** The study made use of both primary and secondary data. The primary data were collected from field investigation or survey using structured questionnaires and interview schedule. Secondary data sources were utilized to provide background information and other necessary to achieve some objectives of the study. Such secondary data includes textbooks, reports, journals, publications and proceedings. Enumerators were trained and used. Basically, data were analyzed using descriptive statistical tools such as mean, standard deviation, and percentages. This was used to analyze objectives 1, 2, 3. A four (4) point Likert type scale of Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD) assigned values of 4, 3, 2 and 1 was used to analyze objective 3 which is mathematically represented as:

$$\frac{4+3+2+1}{4} = \frac{10}{4} = 2.50$$

Therefore, a mean of 2.50 and above was adjudged okay and accepted while any value below 2.50 was not accepted.

Results and Discussions

Socioeconomic Characteristics of Respondents

The socioeconomic characteristics of the respondents investigated in this study included; Sex, Age, Major occupation, Educational attainment, Marital status, Farm size, household size, Membership of social organization, No of organizations belonged and their monthly income level. Table 1 showed that 55.4% of the respondents were males while 44.6% were females. This implies that both the males and the females are involved in agriculture in the area but the greater percentage of the male could be attributed to the dominance of the male folks in agriculture and related business as owners of land and as family heads who take decisions for the family. Fig. 2 shows the distribution of respondents according to their age. The result obtained showed that the respondents with the highest percentage (30.0%) were within the age bracket of 51-60. In the same vein, 27.7% and 26.2% of the respondents were within the age range of 41-50 and 61-70 respectively. The figure further showed that only 13% of the respondents were within the age range of 31-40, while the least percentage of the respondents with 3.1% were above 70. The mean age was 53 years. It implies that majority of the respondents are still in their middle age. They are active to perform farm operations and have the capacity to search for relevant information required to do well in their agribusiness.

Entries in the table above showed that the occupation of the respondents were mostly farming with 59.2% followed by trading with 15.4%. Also, 13.8% of the respondents were self-employed, while 11.5% were civil servants. It further shows that only 3.8% of the respondents engaged in other forms of occupation besides the named ones. Data from table 1 indicated that 47.7% of the respondents had secondary education, 29.2% had primary education, and 11.5% had tertiary education, while 10.0% had adult education. Only 1.5% of the respondents as shown

in the table had no formal education. This implies that the respondents in the area of study acquired the basic education needed for better understanding and usage of ICT devices that will enable them to enhance productivity. This sample thus, is a literate sample. This tells why the farmers are information conscious and can manipulate ICT devices. It agrees with Asiabaka (2002) that the resultant effect of lack of education is resistance to change especially in the spread of information on agricultural innovation that are meant to change the lives of farmers positively.

Again, majority (76.2%) of the respondents were married, 13.1% of them were widowed and 4.6% divorced. On the other hand, only 6.2% of the respondents were single. This indicates that the respondents in the study area were mainly married people. Table 1 showed also that the highest number of the respondents (50.0%), had farm size within 0.5-1.0 hectare, this is followed by 39.2% of the respondents having farm size within 1.5-2.0 hectare, while 10.7% of the respondents have farm size above 2.5-3.0ha.. The mean of the farm size is 1.4ha. This indicates that the respondents are small scale farmers with little cultivable lands which are gotten mostly through inheritance.

Most of the respondents (62.3.%) had a household size of 5-8, followed by 25.4% of the respondents having a household size less than 5, while, only 12.3% had household size above 8. The mean household size was 6.0 persons. This implies that the household distribution is large, as such, provides more labour for farming and large household size may also help to access more agricultural information. Figure 1 result showed that majority of the respondents (75.4%) belonged to one social organization or the other, while 24.6% of them do not belong to any social organization. Farmers belong to and participate in associations or social groups in order to relate and interact with their fellow farmers and also get and share information among

themselves. It is also believed that when they participate in their organizations and associations, they are likely to acquire leadership potential that can help them in disseminating information on important techniques or innovation and also have good administrative structure within the organization (Nwogu, 2007). The respondents who also play leadership role in those organizations are likely to be exposed to important information related to farm innovation and would adopt more innovation than their counterparts due to group dynamics effects (Asiabaka, 2002).

The table showed also that 24.6% of the respondents did not belong to any organization, greater percentage (64.4%) belonged to one or two organizations, while only 10.8% belonged to three or more organizations. This indicates that, majority of the respondents are members of at least one organization. This could be attributed to the fact that, since the farmers must be informed or learned in in order to manipulate ICT devices, they thus belong to and participate in organizations so as to get and also share knowledge and information together. Greater proportion (60.0%) of the respondents earned between ₦ 21,000 to 40,000, followed by a proportion of 25.4% who earned between ₦41,000 to 60,000, while 9.2% earned below₦21,000. Also, only 5.4% of the respondents earned above ₦60,000. The mean income was ₦31,000. The result shows that 30.8% of the respondents who earned above ₦40,000 could readily afford three square meals per day, train their children in schools and also afford most ICT facilities than the greater percentage (69.2%) of the respondents who earned from ₦40,000 below.

Table 1: Socioeconomic Characteristics of Respondents

Attribute	Frequency	Percentage (%)
Sex		
Male	72	55.4
Female	58	44.6
Income (N)		
< 21,000	12	9.2
21,000-40,000	78	60.0
41,000-60,000	33	25.4
Above 60,000	7	5.4
Marital status		
Single	8	6.2
Married	99	76.2
Divorced	6	4.6
Widowed	17	13.1
Household size		
1-4	33	25.4
5-8	81	62.3
Above 8	16	12.3
Education level		
Adult school	13	10.0
Primary	38	29.2
Secondary	62	47.7
Tertiary	15	1.5
No formal	2	
Major Occupation		
Farming	77	59.2
Trading	20	15.4
Self-employed	18	13.8
Civil servant	15	11.5
Farm size		
0.5-1	65	50.0
1.5-2	51	39.2
2.5 & above	14	10.7
Farming Experience		
1-20	14	11.7
20-40	80	66.7
40 & above	26	21.6

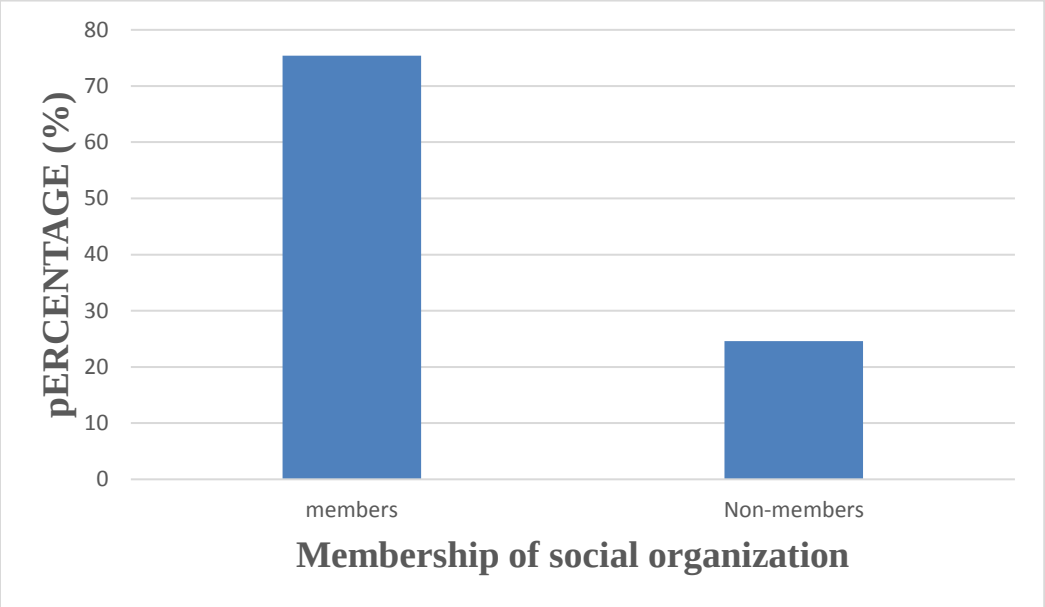
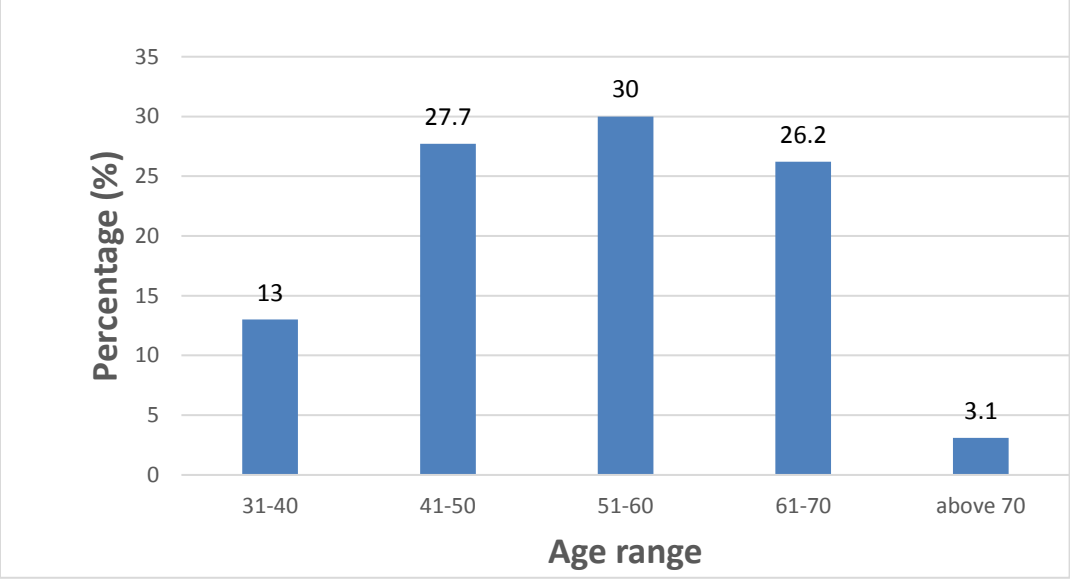


Fig. 1: Distribution of respondents by membership of social organization

Source: Field Survey Data, 2016



$\bar{X}$=53 years

Fig. 2: Age distribution of respondents

ICT Devices Available to the Farmers

Table 2 showed that different ICT devices were available in the study area. It was discovered that radio, mobile phone and television are the most available ICT devices in the area since they had a percentages of 99.2, 97.7 and 76.1% respectively. This implies that these devices are the most sources of technological information and innovation dissemination in the area. This is in line with a study on ICT roles for poverty reduction among urban poor in Zimbabwe, where Bowora and Chazovachii (2010) revealed that the respondents in the informal sector bracket lacked the knowledge and exposure to ICTs other than cell phones, radios and televisions. Newspaper with 57.7% indicates that it is also readily available for use, since agricultural information can be sourced from it. Magazine, and computer withclose average percentages of 30.8 and 29.2 respectively also indicates that information can be sourced through them, but they are not readily available since few respondents had computer in which they can source information. On other hand, the internet and e-mail users are 23.1% and 21.5% respectively which also shows that they are not readily available but to some extent, still serve as means of getting information. This could be due to high cost of subscription or poor network coverage. Digital camera and CD-ROM have the least percentages of 2.3 and 3.1 respectively. This shows that they are the least available ICT devices by which the farmers source information in the area. In all, the result shows that radio is the most readily available device and this agrees with (Sida, 2005) that radio is unique in that it is relatively inexpensive to set up, it is estimated that more than 50% of all households in developing countries have ready access to radio receivers,

receiving broadcasts does not require literacy, and it can use indigenous languages even if the population served is small, this accounts for its usefulness on a regular basis.

Table 2: Distribution of available ICT devices to the farmers

Available ICT devices	**Frequency	Percentage (%)
Mobile phone	127	97.7
Television	99	76.1
Radio	129	99.2
Computer	38	29.2
CD-ROMs	4	3.1
Internet	30	23.1
Newspaper	75	57.7
Magazine	40	30.8
Digital camera	3	2.3
E-mail	28	21.5

****multiple responses**

Source: Field survey data 2016

Effects of Use of ICTs on Farmers' Knowledge

As mentioned earlier, Knowledge is considered as the fourth production factor after labour, land and capital (AFAAS, 2011) and is particularly critical in the agricultural sector .Table 3 showed the distribution of the respondents based on the effects of ICT on their knowledge. A decision rule was made to indicate that, any mean value from 2.50 and above($\bar{x} \geq 2.50$) was adjudged

agree while any mean value less than 2.50 ($\bar{x}$< 2.50) was adjudged disagree. From the result however, the respondents agreed that the following are the effects of ICTs on their knowledge; increase knowledge of use of improved seeds($\bar{x} = 3.25$), increase knowledge of use of fertilizer ($\bar{x} = 3.18$), adapting cropping strategies to climate variability ($\bar{x} = 3.15$), knowledge on weather condition($\bar{x} = 3.03$), increase knowledge of use of pesticides ($\bar{x} = 2.97$), improve use of equipment ($\bar{x} = 2.93$), ability to forecast disaster ($\bar{x} = 2.92$), information provision and sharing ($\bar{x} = 2.86$), increase knowledge of use and management of water ($\bar{x} = 2.86$) and knowledge of crop yield production**(**$\bar{x} = 2.66$**).** This result strongly agreed with the work of Pehu et al (2011) that ICT can also lead to more optimal use of inputs. Increasing producers' knowledge of how to use and manage water, equipment, improved seed, fertilizer, and pesticide has improved the intensification of farm practices around the world. Knowledge sharing, exchanging and dissemination are elements in a broader theme which is Knowledge management. The central purpose of knowledge management is to transform Information and intellectual assets into enduring value (Metcalfe, 2005). The basic idea is o strengthen, improve and propel the organization by using the wealth of information and Knowledge that the organization and its members collectively possess (Milton, 2003). It has been pointed out that a large part of knowledge is not explicit but tacit (Schreiber et al., 1999). This is true for knowledge in agriculture where a lot of good practices are transferred without being well documented in books, papers or extension documents. To manage the knowledge properly, ICT is needed. In effect, there are many information technologies that can be used for knowledge management

Table 3: Effects of Use of ICTson farmers' knowledge.

Effects on their Knowledge	$\overline{Mean\ (X)}$	**Standard Deviation (S.D)**
Knowledge on improve use of equipment	2.93	0.94
Increase knowledge of use and management of water.	2.86	0.82
Increase knowledge of use of improved seeds.	3.25	0.87
Increase knowledge of use of fertilizer	3.18	0.79
Increase knowledge of use of pesticides	2.97	0.83
Knowledge on weather condition	3.03	0.88
Information provisions/sharing	2.86	0.87
Knowledge of nutrient forces	2.71	1.07
Knowledge of crop yield potential	2.66	1.02
Ability to forecast disaster	2.92	1.02
Adapting cropping strategies to climate variability	3.15	0.87

Decision rule: Mean effect ($\bar{x}$) ≥ 2.50 = Agree; Mean effect ($\bar{x}$) < 2.50 = Disagree

Conclusion

The study revealed that radio, mobile phone and television are the most available ICT devices, while digital camera and CD-ROM are the least available devices in the area. Others include; newspaper, Computer, e-mail, magazine and internet which are also available for sourcing information. Information and communication Technology has some significant effects on the respondents' knowledge,

References

Asiabaka, C.C. (2002). Agricultural Extension: A handbook for developing practitioners. Molysfem Limited Services.

AFAAS. 2011. Concept and learning framework for the African Forum for Agricultural Advisory Services. Kampala, Uganda

Bowora, J. and Chazovachii, B. (2010). The role of information and communication technologies in poverty reduction in Zimbabwe: An analysis of the urban poor in Harare. *Int. J.Polit. Good. Govern.* 1, 1-3.

IMSG, (2010).Education in Imo State. Imo State, Nigeria: Ministry of information, Owerri, Imo State Government

Metcalfe, A.S. (ed). 2005. Knowledge management and higher education: A critical analysis.[Online]. Available at http://site.ebrary.com/lib/aucairo/Doc?id=10084481&ppg=14 Inform. Sci. Publ.

Milton, N. 2003. Knowledge management. Available at http://www.epistemics.co.uk/Notes/40-0-0.htm

National Population Commission (NPC) (2006). Official Population Report of South East Nigeria.

Nwagwu, W.E and Opeyemi, S. (2015) ICT Use in Livestock Innovation Chain in Ibadan City in Nigeria. *Advances in Life Science and Technology*, 32.

Pehu, E., Belden C. and Majumdar S., (2011). Module 5: Increasing crop, livestock, and fishery production through ICT. *ICT in Agriculture.*Washington DC, 20433. www.worldbank.org.

Sida, (2005). ICTs for Poverty Alleviation: Basic Tool and Enabling Sector ICT for Development Secretariat, Department for Infrastructure and Economic Cooperation, Canada

Schreiber, G., H. Akkermans, A. Anjewierden, R. De Hoog, N. Shadbolt, W. Van De Velde, et al.1999. Knowledge Engineering and management: The common KADS methodology. MIT Press,Cambridge, MA.

UNDP, 2012.Promoting ICT based agricultural knowledge management to increase production and productivity of smallholder farmers in Ethiopia.

.