Use of ICTs for Agricultural Extension Communication among Extension Staff in National Cereals Research Institute, Badeggi, Niger State

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Abstract
This study assesses the use of ICTs for agricultural extension communication among extension staff of National Cereals Research Institute (NCRI), Badeggi. The study was set to identify various ICT tools that extension staff of the Institute have access to and use for agricultural extension communication and to examine ICTs utilization and constraints in the use of ICT tools. The study adopted the Diffusion of Innovation theory. Likewise, In-depth Interview was applied as method of data gathering. A total of five extension staff were purposively selected. The result revealed that the respondents have access to radio, television, mobile phones, CD-ROMs and DVD. They equally have limited access to the internet facilities and the likes of Skype, Blogs, e-mail, and YouTube used for packaging information to the farmers. Also, the ICT utilization by the extension staff appeared to be high from the angle of radio and television only while ICT tools (such as Skype, Blogs, e-mail, YouTube, Internet and Call-Centers) are not used by the extension staff in packaging and disseminating programmes to the farmers. Equally, the result identified some constraints as regards the use of ICT tools to poor or even in some instances lack of network, inadequate access to ICT tools, erratic power supply, poor communication network, and little knowledge of the modern ICT tools by the extension staff. Based on the findings, it was recommended that extension staff should be encouraged on the continuous use of the conventional ICT tools as it has been established to be very effective in packaging and disseminating agricultural information to the farmers. The study equally recommended that respondents should be encouraged on the use and vast benefit of adopting the modern ICT tools.
Keywords: *Use, ICTs, Agricultural Extension Communication and Extension staff*

Introduction
There is hardly any area of human activity these days that has not been touched by the dramatic changes in Information and Communication Technologies (ICTs). Asemah (2011, p.272) defines Information and Communication Technologies ICT as "a diverse set of technological tools and resources used to communicate and to create, disseminate, store and manage information". They are technologies that facilitate communication and transmission of information by electronic means (Agwu & Ogbonnah, 2014). Equally, Olise (2011) noted that ICTs refer to

"technological devices or computer enabled communication technologies used for the acquisition, processing and dissemination of information to a large heterogeneous audience regardless of time, space and distance". These technologies are increasingly being seen as cost-effective and as practical tools to facilitate information delivery and knowledge sharing between extension staff and farmers (Annor, Kwarteng &Agunga, 2006).

ICT has important roles in enhancing the growth of productivity, it can be systematically employed to increase farmers' participation in agricultural development as well as inform, educate, enlighten, inspire and train the rural population (Arkhi, Darvishi, & Adibnejad, 2008). Agricultural extension communication which depends, to a large extent, on the dissemination of improved and proven agricultural information to farmers is one area in which ICT can have a significant impact (Xiaolan & Akter, 2015). The goal of agricultural extension communication is the dissemination of information to farmers through the use of a variety of communication means and to assist farmers make informed decisions (Koyenikan, 2008). The use of ICTs for agricultural extension communication has witnessed an increase in recent years in some African countries (CTA, 2003; Arokoyo & Oyebanji, 2007; Agwu & Ogbonnah, 2014).

Though there are many uses for ICTs in facilitating dissemination of agricultural information and advocacy in the context of improving the agricultural sector in Nigeria, literature indicates weak and inadequate framework on the use of ICTs for agricultural extension communication by extension staff of agricultural research institutes in Nigeria. Consequently, this study examines the level of usage of ICTs for agricultural extension communication among extension staff of National Cereals Research Institute.

Problem Statement

Literature has shown that ICTs are vital and important means of communicating and disseminating information to farmers of this generation and next (Magasa, 2015; Haruna & Baba, 2017). For most developing countries, the use of ICTs for agricultural extension communication has become a priority as few countries like South Africa, Ghana, Uganda, and Kenya have achieved effective use of ICTs for agricultural extension communication (Arokoyo & Oyebanji, 2007; Omotayo, 2011; Agwu & Ogbonnah, 2014). However, the situation is different in some developing nations like Nigeria where the use of ICTs for agricultural extension

communication is still emerging as many agricultural research institutes and extension organizations have limited internet access, Call-centres and e-mail (Arokoyo & Oyebanji, 2007; Omotayo, 2011; Eze, 2013; Agwu & Ogbonnah, 2014; Haruna, 2015). Nevertheless, despite these challenges, ICT is still being used to facilitate agricultural extension communication in Nigeria. Therefore, this study examines the level of usage of ICTs for agricultural extension communication among extension staff of National Cereals Research Institute.

Objectives of the Study

The aim of this study is to examine the level of usage of ICTs for agricultural extension communication among extension staff of National Cereals Research Institute. Specifically, the study has the following objectives:

1. to identify various ICT tools that extension staff of National Cereals Research Institute have access to and use for agricultural extension communication.
2. to examine ICT utilization for agricultural extension communication by extension staff of National Cereals Research Institute.
3. to examine the constraints in the use of ICT tools for agricultural extension communication by extension staff of the Institute.

Literature Review

Information and Communication Technologies (ICTs) in Agricultural Extension Communication

Agricultural extension communication which depends largely on the use of ICT tools for dissemination of improved and proven agricultural information to farmers is known to have significant impacts. Saravanan (2014), in his research on "ICTs for agricultural extension communication : Global experiments, innovations and experiences", enumerated the place of ICT in agricultural extension communication to include the following: to accelerate agricultural growth, to expand knowledge resources, to facilitate better information access, to supplement inadequate technical manpower, for stronger research-extension-client system linkage, to develop efficient feedback mechanism, for cost-effective extension delivery, to develop knowledge managers, to ensure gender equity in technology transfers process, to empower small and marginal farmers and to serve the farm stakeholders beyond technology transfer role. He acknowledged that possession of ICT device

is seen as an entry point to acquisition, accessing and usage of ICT as a productive asset to promote and support agricultural activities by farmers.

In India, Merra, Jhamtani and Rao (2004) in their study on "Information and communication technology in agriculture: a comparative analysis of three projects from India" revealed the areas where ICT can play important roles in extension communication to include: broad basing agricultural extension activities; developing farming system research and extension; having location-specific modules of research and extensions; and promoting market extension, sustainable agricultural development and participatory research.

Similarly, Apantaku and Lawal (2009) note that a notable area of ICT application is agriculture, where it has been effectively applied for dissemination of information. For instance, computer in its ordinary form has been successfully used for word and data processing/analysis of agricultural information and graphic design. Also, networking of work-station computers creates instant access to production areas such as field, barn and packaging houses for obtaining site-specific field data, which may range from rates of seed and fertilizer use, labour, soil features to weather information. Global networking computers for the Internet helps to ensure efficient information creation, documentation, display and exchanges between user of information through the utility features such as World Wide Web (www) and the electronic mail (e-mail).

Richard (1993), cited in Food and Agricultural Organization (1999), delineated the place of information and communication technology (ICT) in support of agricultural and rural development. These are: economic development of agricultural producers; community development; research and education; small and medium enterprises development; and media network. This corroborates Nwobodo and Nwabugwu's (2016) view that the ICT tools should be intensified by the agricultural research institutes and that this can be achieved by the acquisition of modern ICT tools, adequate power supply, cooperative work by extension staff and access to the Internet always.

Conversely, it could be deduced that the place and important features of ICT that make it more useful to extension communication is the connectivity and communication services. Greenidge (2003) affirms that this innovative technology

has the potential of transforming communications in the rural areas in Nigeria and offers new options for communication management in diverse fields of endeavor.

Empirical Review

Agwu, Uche-Mba and Akinnagbe (2008) conducted a study on the use of information and communication technologies among researchers, extension staff and farmers in Abia and Enugu states. Data for the study were generated from a sample of 110 respondents using structured interview schedule and questionnaires. The findings revealed that there is inadequate use of ICT tools for agricultural extension communication. The study concluded that if modern ICT tools are not adequately built into the mainstream of Nigerian agricultural extension system, there is likely to be stagnation in the dissemination, utilization and application of scientific agricultural information for purposeful development of the system. Equally, Arokoyo and Oyebanji (2007) in their study on information and communication technologies: the preparedness of extension staff in Nigeria for their application revealed that extension staff in Nigeria are currently ill-equipped in the application of ICTs even in their rudimentary form. The study further revealed that to enhance familiarity with, and application of ICT tools, intensive training of and increased access to personal computers by all cadres of extension staff in Nigeria are necessary.

In a review conducted by Lucky and Achebe (2013) on information and communication technology and Agricultural information dissemination: a study of Institute of Agricultural Research, Ahmadu Bello University, they noted that the use of ICT poses a great challenge to the extension staff confronted with the burden of disseminating agricultural information to rural farmers because of low level of deployment of ICTs and high level of illiteracy. The paper concluded that there is a low level of deployment of ICT in information dissemination in this very important segment of the economy and as such this leaves a lot of room for improvement. This corroborates the findings of Apantaku and Lawal (2009) in their study on ICT status of agricultural research and extension organizations in south-west Nigeria. A combination of purposive and random sampling was used in four states; eight agricultural research institutes and four states Agricultural

Development Programme were selected as sample. The findings revealed that the status of the Internet, website and telex/fax was unsatisfactory and that a majority of the organizations had poorly functional internet and websites services, and that the only functional ICTs were radio and television which were used for agricultural information dissemination for farmers. Equally, the study revealed that the problems adduced for this in Nigeria included inadequate ICT knowledge and skills, erratic electricity supply and poor funding. The study recommended proper development of ICT infrastructure, ICT education and training and deployment of ICTs for agricultural extension communication.

Haruna (2015) conducted a study on internet use for extension communication among agricultural research institutes and farmers in north-west Nigeria. Data were collected with the use of questionnaire. The findings revealed that 60% of the extension staff and 65% of farmers lack knowledge of other uses of the Internet as it is recommended in the study that extension staff and farmers need to be trained on various uses of the Internet for agricultural extension communication purposes. Equally, Ezeh (2013) in a study on Extension staff access and utilization of information and communication technology for agricultural extension communication in South East Nigeria revealed that access and use of contemporary ICTs like the Internet among extension staff in South Eastern Nigeria is very low. He recommended adequate training on the use of contemporary ICTs for extension staff.

Similarly, Salau, Agwu and Egbule (2014) in their research on constraints to use of information and communication technologies for agricultural information dissemination by Non-Governmental Organizations in Nasarawa, Nigeria revealed that the major constraints faced by participants in the use of ICTs for agricultural information dissemination is poor internet connectivity, high cost of ICT equipment, inadequate capital, high illiteracy rate of clients, poor power supply and lack of technical support. The study recommended that government should facilitate the evolution of appropriate ICT policies in Nigeria by providing relevant ICT infrastructures and work towards a common goal of ensuring rural development. This corroborates Salau and Saingbe (2013) in their studies on access and utilization of information and communication technologies among agricultural researchers and extension workers. The findings indicated that the main constraint affecting the utilization of ICTs by agricultural research institutes are poor accessibilities to ICT tools, low level of computer literacy, lack of confidence in

operating modern ICTs, poor finance, and lack of power supply which hindered them to disseminate farm innovation messages to farmers.

Theoretical framework

Diffusion of innovation theory was used for this research. It was propounded by Ryan and Gross in 1943 and modified by Everett Rogers in 1960. Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system (Everett, 1983). It is a special type of communication concerned with the spread of messages that are perceived as new ideas. Diffusion of innovation theory in this study is relevant in analyzing innovativeness and adopter categories of extension staff in terms of ICT use for extension communication. This study argues that ICTs is an innovation in terms of workforce management. Innovativeness is the degree to which an individual is relatively earlier in adopting new ideas than the other members of a system, and the five adopter categories are: innovators, early adopters, early majority, late majority, and laggards, (Everett, 1983).

Sahin (2002) states that the process of adopting new innovations has been studied for over 30 years, and one of the most popular adoption models is described by Rogers in his book, Diffusion of Innovations. Everett (1983) noted that:

> One reason why there is so much interest in the diffusion of innovations is because getting a new idea adopted, even when it has obvious advantages, is often very difficult. There is a wide gap in many fields, between what is known and what is actually put into use. Many innovations require a lengthy period, often of some years, from the time when they become available to the time when they are widely adopted. Therefore, a common problem for many individuals and organizations is how to speed up the rate of diffusion of an innovation.
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> To get the bad customs of a country changed and new ones, though better, introduced, it is necessary first to remove the prejudices of the people, enlighten their ignorance, and convince them that their

> interests will be promoted by the proposed changes; and this is not the work of a day. (Benjamin Franklin, 1781 in Everett, 1983)

It is widely observed that many people, including technologists and scholars think that advantageous innovations will sell themselves, that the obvious benefits of a new idea will be widely realized by potential adopters, and that the innovation will therefore diffuse rapidly. Unfortunately, this is very seldom the case. Most innovations, in fact, diffuse at a surprisingly slow rate.

However, the basic assumptions of the theory according to Anaeto, Onabajo, and Osifeso, (2008, p.116) are:

- Diffusion research centres on the conditions which increase or decrease the likelihood that a new idea, product, or practice will be adopted by members of a given culture.
- Diffusion of innovation theory predicts that media as well as interpersonal contacts provide information and influence opinion and judgment.
- Opinion leaders exert influence on audience behaviour via their personal contact, but additional intermediaries (called change agents and gatekeepers) are also included in the process of diffusion.
- The information flow through networks; the nature of networks and the roles opinion leaders play in them determine the likelihood that the innovation will be adopted.

Sahin (2001) says Rogers' diffusion of innovations theory is the most appropriate for investigating the adoption of technology in several fields including agricultural extension communication.

Methodology

This study adopts the In-depth Interview method to gather information on the usage of ICT tools for agricultural extension communication among extension staff of National Cereals Research Institute. The justification for using In-depth interview as a method is to explore respondent's point of view, experiences, feelings and perspective on the use of ICT tools for agricultural extension communication. The population of this study consists of extension staff of National Cereals Research Institute. Purposive sampling was used for selecting extension staff in the agricultural research institute. Neuman (2012) says that purposive sampling is used when a researcher uses his/her judgment in selecting cases with specific purpose in

mind. It is also used to select members of population that are difficult to reach or specialized population for in-depth investigation. Consequently, purposive sampling was used in selecting five extension staff that were interviewed for the study. The rationale for the selection of extension staff is based on those that have immense experience and knowledge on extension communication and are directly involved in extension activities. Hence, five In-depth Interviews were held in the National Cereals Research Institute.

Findings and Discussion

Based on the data gathered from the five In-depth interview sessions, the following constitute the aggregate of the entire findings of the study as summed up under the following headings:

a. Accessibility and use of ICT tools

Data from the In-depth Interview Sessions indicate that the respondents have access to radio, television, mobile phones, CD-ROMs, DVD and to some extent the Internet. They have limited access to the internet facilities and the likes of Skype, Blogs, e-mail, and YouTube used for packaging information to farmers. Also, the use of conventional ICT tools by the extension staff is limited to radio and television and in the case of modern ICT tools, they use mobile phones for call and text to farmers and all other ICT tools like E-mail, Skype, Blogs, You Tube and Call-Center are not used by the extension staff for agricultural extension communication. This corroborates the findings of Arokoyo and Oyebanji (2007), Omotayo (2011), Agwu and Ogbonnah (2014) and Haruna (2015) that the use of modern ICT tools is still emerging as many agricultural research institutes and extension organizations have limited internet access Call-centre and e-mail. In the same vein, Lucy and Achebe (2013) conducted a study and found that there is low level of deployment of ICTs in the agricultural research institutes.

b. Utilization of ICT tools

Their utilization of ICT tools appeared to be high from the angle of radio and television in the dissemination and packaging of agricultural programmes by the extension staff of the Institute. Respondent four said radio and television are widely engaged in many activities by the National Cereals Research Institute like

informing farmers on its Mandate crops: that is, land preparation, planting methods, weeding, fertilizer application, harvesting and storage of rice, maize, grain legumes, soya beans, beniseed and sugarcane,. Equally, they use mobile phone in their extension activities. This is congruent with the findings of Arokoyo and Oyebanji (2007) and Apantaku and Lawal (2009) that the major functional ICTs used for dissemination of agricultural information to farmers are radio, television and mobile phone to some extent.

Other ICT tools such as Skype, Blogs, e-mail YouTube, Internet and Call-Centers in the Institute are not used by the extension staff in packaging and disseminating programmes to farmers. Agwu, Uche-Mba and Akinnagbe (2008) reveal that there is inadequate use of modern ICT tools for agricultural extension communication. The study concluded that if modern ICT tools are not adequately built into the mainstream of Nigerian agricultural extension system, there is likely to be stagnation in the dissemination, utilization and application of scientific agricultural information for purposeful development of the system.

c. Constraints of ICT tools

The constraints faced in the use and utilization of ICT tools by the extension staff is pointed out in the in-depth interview sessions. Constraints as identified are: poor or even at some instance lack of network, inadequate access to ICT tools with erratic power supply, poor communication network, little knowledge of the new ICT tools by the extension staff, lack of internet access in the rural areas with the barrier of having most farmer having non-formal education, are the aggregated constraints pointed by the respondents. This is congruent with Salau et al. (2014) who found that there is poor internet connectivity, inadequate access to ICT tools with erratic power supply, high-level illiteracy of farmers and computer illiteracy among extension staff and scientists. In the same vein, this corroborates Salau and Saingbe (2013) and Haruna (2015) who submit that the main constraints affecting the utilization of ICTs by agricultural research institutes are poor internet access, poor accessibilities to ICT tools, low level of computer literacy, lack of confidence in operating modern ICTs, poor finance, and lack of power supply which hinders them from disseminating farm innovation messages to farmers.

Conclusion

The results point out that the prevalence of ICT, as dominated among the respondents, is only on the application of the conventional ICT tools in packaging

information to farmers as per making their major products simultaneously visible and accessible as when needed by their end users. Thus, they majorly rely on the likes of radio, television and to some extent mobile phone, CD-Rom and DVD.

Recommendations

- Extension staff should be encouraged on the continuous use of the conventional ICT tools as it has been established to be very effective in packaging and disseminating agricultural information to the farmers.
- Respondents should be encouraged on the use and vast benefit of adopting the modern ICT tools.
- Management of the Research Institute should take more pragmatic steps to improve power supply and internet facilities for their institute in order to improve on information sharing between them and their target farmers.

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