



**INFORMATION AND COMMUNICATION TECHNOLOGIES FOR EFFECTIVE
AGRICULTURAL EXTENSION COMMUNICATION IN NIGERIA**

Ahmed Abubakar

Department of Mass Communication, Ahmadu Bello University, Zaria
ahmed.abubakar98@yahoo.com

ABSTRACT

The paper proposes an effective use of information and communication technologies for agricultural extension communication in Nigeria. The broad objective of the study is to examine information and communication technologies as a medium for agricultural extension communication. The agricultural extension service in Nigeria has traditionally been through the Training and Visit (T&V) system. The Training and Visit system had its success. However, there were challenges by the extension staff to effectively provide needed agricultural information to farmers due to the farmer ratio in the country. It is in this regard that the use of ICTs is proposed which includes internet, search engines, telephones (fixed and mobile), short message services (SMS), e-mails, digital cameras, pocket digital assistant, computer, video, contact data bases & systems, flash drive, CD-Rom, DVD and Call-Center. Information and communication technology when used for agricultural extension communication will enhance the delivery and access to knowledge to farmers; and improved the breadth and scope of agriculture, increase learning rates, encourage critical thinking and offer unlimited means of achieving agricultural extension delivery. The study concludes that ICTs can actually transform the agricultural extension service in Nigeria because of its remarkable potential of increasing the speed of agricultural information dissemination to farmers. The study recommends that rigorous awareness campaigns should be undertaken to make extension staff and farmers aware of the existence of modern ICT tools so that they can utilize it. The study equally recommends that intensive hand-on training on the use of ICTs for agricultural extension communication to all actors should be undertaken on a regular basis.

Key words: ICTs, Agriculture and Agricultural Extension Communication

INTRODUCTION

Information and Communication Technologies (ICTs) are electronic communication systems that augment the way in which information is processed, stored, retrieved, shared and disseminated for communication reasons. Tinio (2005) cited in Asemah (2011) defines ICT as "a diverse set of technological tools and resources used to communicate and to create, disseminate, store and manage information". In the same vein, the Food and Agricultural Organization (FAO) (1993) defines ICT as "technologies involved in collecting, processing, storing, retrieving, disseminating and implementing data and information using microelectronics, optics and telecommunications and computers". Equally, it is defined as "technologies that facilitate communication and the processing and transmission of information by electronic means" (CTA, 2003, Arokoyo, 2011 cited in Agwu and Ogbonnah 2014).

The term ICT emerged to be commonly used to embrace a horde of media, including television, telephone, radio, video, telex, voice information systems and fax as well as those requiring the use of personal computer fitted with a modem (Warren, 2002). It represents modern productive asset for receiving and sharing information as well as packaging of messages (Ifejika, 2013). Information and Communication Technology is often described as the technologies where computers and telecommunication devices are used for information gathering, processing, storage, retrieval and dissemination to the relevant users. For instance, the use of ICTs in research and extension arises because of the increased demand for information and increasing

number of information sources. Indeed, the advent of ICTs has brought a paradigm shift in human society and growth productivity which created irreversible change in the society. Pate and Bashir (2011) noted that "the significant transformations in information and communication technologies have profoundly affected the way and manner people communicate with one another irrespective of the context". They also acknowledged several components of ICTs, hardware and software like mobile phones, the computer, the internet and a host of other accessories are now popularly and economically utilized in various types of communication contexts. The recent developments of ICTs have completely changed the way people communicate, share information and even do their businesses. Moreover, ICTs have a great deal of potentials, not only for ensuring effective information management but also for effective linkages and interactions between information producers and consumers. Considering this, ICTs have come to be widely applied in various spheres of human economic and social activities (Apantaku and Lawal 2009). From the above preceding definitions, it is clear that many electronic based communication systems can expediently fit into the description of ICTs. Intrinsically, it becomes apparent that the application of many of the devices is not entirely new in agricultural extension communication. As Mucemi *et al.* (2009) stated that: ICTs have become increasingly integrated into information disseminated to farmers. For decades "traditional" forms of ICTs have become more prevalent in advisory service provision. Radio and Television programmes feature agricultural information. Rural telecentres provide information on education, agricultural and

health issues and equip rural citizens with skills on how to use computers and provide basic literacy. National ministries of agriculture have attempted to integrate ICTs into the delivery of information and have established district information centres focusing on agriculture. Many NGOs and research organizations have also attempted to facilitate technology transfer in the agricultural sector. In fact, the use of ICT has witnessed an increase in recent years in most developing countries despite the problems of connectivity, cost, access, content and literacy. The advent of ICTs, especially in the area of telecommunications brings both opportunities and challenges. Agricultural extension communication which depends largely on information exchange between and among farmers and a broad range of other actors is an area in which ICT is known to have significant impacts. According to Okunlola (2008) agricultural extension communication involves the methods of planning and packaging information to bring changes in farmers' behaviour and farming practices. The advent of modern ICTs augments the dissemination of agricultural information to farmers. Modern ICTs plays key 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 and inspire and train the rural populations. Forefronts are the extension staffs that have direct link between farmers and other actors in the agricultural knowledge and information, are in position to make use of ICTs to access knowledge and information that facilitate the dissemination of agricultural information. Kaushik and Singh (2004) noted that modern ICTs allow for efficient and transparent storage, processing and

communication of information to farmers. Growth in ICT investment is also found to be positively associated with growth in both GDP and productivity in Asia-Pacific countries for the period 1984-1990 (Kraemer and Dedrick, 1994). It is increasingly recognized that modern ICT are necessary for accessing required information and knowledge (Richardson 1997; Chapman and Young, 2004; Yekini and Olaniyi, 2007; Apantaku and Lawal, 2009; McNamara 2009; Aker 2010 and Oduetichie, Umar and Oseni 2014). Jensen (2007) established that ICT has helped fishers along the coastline in Kerala, India to learn about prices at different locations and decide where to sell their products profitably. According to Nlerum (2014) and Godtland, Sadonlet, Dejanvery and Ortiz (2004), ICT would enable extension staff to gather, store, retrieve, share and disseminate a broad range of information needed by small producers such as information on best practices, new technology, better prices of inputs and outputs, better storage facilities, improved transportation links, collective negotiations with buyers and information on weather. ICT augments the ability to search for information and increase the quantity of information available, eventually reducing uncertainty and enhancing market participation. In this existing scenario, it is expected that integration of ICTs for agricultural extension communication will provide needed impetus to agricultural sector and ICTs can complement the traditional extension system for "Knowledge Resource" delivery to the millions of the farmers (Saravanan, 2014). The broad objective of the study is to examine the modern information and communication technologies as a medium for agricultural extension communication. The specific objectives were to determine

how modern information and communication technologies can be effectively harnessed:

- i. to accompaniment the conventional approaches in meeting farmers need for agricultural information on different crops.
- ii. to proffer suggestion on the essentials of the modern information and communication technologies as a medium for agricultural extension communication.

Information and Communication Technology policy on Agriculture in Nigeria

The Federal Government of Nigeria has developed an Information Technology Policy and Communications Act since 1999 (MST, 1999). This policy helped the development and use of ICT products and services in the country. National Information Technology Development Agency (NITDA) and National Communications Commission (NCC) have been empowered to ensure compliance with these government policies. The nation shall use Information Technology (IT) to re-engineer agriculture for the purposes of maximizing food production, improving food self-sufficiency and security, increasing output for industrial raw material utilization, providing employment, economic growth and minimizing environmental abuse and degradation (MST, 1999). The objectives of the policy are to: optimize land use for food production; provide employment for the citizenry; minimize urban migration; develop and protect a sustainable agricultural environment. Moreover, the policy creates avenue for establishing an agricultural information system to provide support for planning, production, storage and distribution of horticultural crops, livestock, and fisheries products among others. In essence, it will create

information Technology (IT) awareness for all types of farmers at all levels nationwide.

Why the Use of Information and Communication Technology?

As a results of the changes and challenges affecting the delivery of information to farmers that relate directly to or complicate the emergence of demand driven extension and decentralization. These developments point the need for ICTs as a means to facilitate agricultural information to farmers.

Information and Communication Technology Tools in Extension

According to Food and Agricultural Organization (1998) cited in Arokoyo (2011) "With respect to ICTs use, the interest of Agricultural Extension is Communication for development defined as "an innovative way of reaching and interacting with people more effectively wherever they may be" and ICTs become handy tools.

The ICT tools that have immense potential for use in agricultural extension communication Include: internet, search engines, the web, You Tube, telephones (fixed and mobile), Skype, short message service, packet digital assistants, digital cameras, video, e-mail, computer, CD-Rom, DVD, flash drive, radio, television, group ware, rural radio and Contact Data Bases & Systems. Regardless of the tool, the focus must be on the people who will use the technologies and the context rather than the technologies themselves (Arokoyo, 2011).

Essentials of ICT in Rural Development

The significance of ICT to agricultural extension communication in third world countries is indisputable (Omotayo 2011). The Asian Development Bank (2003) stated that ICT has become a powerful tool in providing developing countries with opportunities to meet vital development goals far more effective than before. Governments in several countries have reduced their direct involvement in agricultural services provision. Thus, this creates greater challenge for the use of ICTs in extension communication to remain relevant and effective. Bheenick and Brizamohun (1999) say giving farmers access to a variety of information sources, which are accessible, affordable, relevant and reliable is the ultimate aim of providing agricultural information services. This improvement reflects a requirement for alternative sources of information rather than interpersonal (Face-to-Face), information services. Richardson (2003) says ICT have been found as the only way in which agricultural extension can achieve this. According to Munyua (2000) and Asian Development Bank (2003) countries such as India, Chile, Mexico, Peru, South Africa, Uganda, Mauritius and Egypt, ICT has played a major role in diffusing information to rural communities. In India, Govindaraju and Mabel (2010) reported that the fishermen of Kovalam fishing village use their ICT gadgets (mobile phones with global position systems services) provided in the village knowledge centre to send information on list of places where fish will be available in huge quantities on that particularly day, height of the waves, weather forecast, market price of the fish, important news and emergency telephone numbers.

Moreover, according to Gibbon and Warren (1992); Woodburn *et al.* (1994); Amponsah (1995); Ortman and Stockil (1998); Kenny (1999); Premkumar and Roberts (1999) and Jaragola *et al.* (2001) noted that the literary world is full up with works on ICTs either in the rural or urban context. Warren (2003) itemized several studies on the role of ICT in various disciplines ranging from enterprise management information systems, through personal computers and internet technology. The need to enhance the standard of living of the rural inhabitants and reduce rural poverty through information dissemination is obvious (Omotayo 2011). He buttressed further that, access to information has the potential to contribute to poverty alleviation, food security, creation of employment opportunities and informed decision making by all. Hence, ICTs are also fundamental to enabling advisory services to fulfill their primary role in an agricultural innovation system, which serve as central node for knowledge sharing and innovation brokering (Rudgard *et al.*, 2015).

Information and Communication Technology' Application in Agricultural Extension Communication

Having known some of the essentials of ICTs, it is logical to now determine their applications in Agricultural Extension and Rural Development. The 6th Consultative Expert Meeting of CTA's Observatory on ICTs (CTA, 2003) listed the following as a potential ICT application in extension: enhance farmer's ability to collate demands; collaborative learning; exchange of time sensitive information e.g. market prices, disease outbreaks, etc. make extension systems and structures more

efficient; engage farmers in assessing own needs, solutions; facilitating multi-stakeholder brainstorming; exploring alternative production technologies; facilitating access to markets and credits; training and demonstration; community learning; search, select and compile information for individual clients; early warning for disasters, etc and weather forecast; and peer to peer sharing and exchange among extension. Hence, the application of ICTs in agricultural extension communication as can be seen from above is almost limitless (Arokoyo, 2011).

Impact of ICTs in Agricultural Extension Communication

If adopted and properly used, ICTs have the potential to really transform agricultural extension in Nigeria. Their impact could include: farmers more intelligent and more varied ICT users; some farmers connect directly by passing extension works; extension re-directed towards those who pay for information; ICTs will become "everyday" tools of extension workers; jobs and roles of extension workers change to become consultants; extension workers need new skills and feedback between extension and clients will improve (Arokoyo, 2011).

Review of Previous Studies on Use of ICTs in Agricultural Extension Communication

Oduehie, Umar and Oseni (2014) in their research on Web-based media for agricultural extension communication reveals that ICT channels have tremendous potential of increasing the speed and efficiency of agricultural information

dissemination to farmers' regardless of geographical location, time, and size of enterprise, thereby increasing farmers' ability to produce more and have market information that is necessary to attain good, reasonable profit. They buttressed further that massive awareness campaign should be organized to make farmers and other stakeholders in agriculture aware of the existence of the ICTs platforms so they can be able to make the best use of it. Haruna (2015) in his study on internet use for agricultural extension communication among agricultural research institutes in Nigeria reveals that internet usage for agricultural extension purposes is minimal and that its utilization can breach the gap of farmer extension ratio in Nigeria. Xiaolan and Akter (2015) conducted a study in India on the use of ICT for agricultural extension communication; they reveals that the amount and quality of information received by the farmers have been improved significantly as a result of the use of ICT. The study further reveals that there are also indirect benefits from this ICT-enhanced services delivery system not only in greater awareness and knowledge in agricultural technology and information but also in terms of farmers' attitude towards new technology and new ways of life in the future. Godtland *et al.* (2004) reported that ICT is vital in facilitating communication and efficient information dissemination for agricultural and rural; development. Since agriculture plays an important role in the economy of any nation, ICTs can be used for agriculture and rural development due to its capacity to reach and disseminate information to farmers very fast, (Abubakar and Umar 2014). Donovan (2011) in his research on ICT (mobile devices) and their impact on agriculture and rural development reveals that ICTs

help to increase income, improve efficiency of markets, reduce transaction costs and offer a great opportunity for innovative interventions, especially in extension service delivery. The World Bank study in Philippines found strong evidence that purchasing a mobile phone is associated with higher growth rates of incomes (Labonne and Chase, 2009). This reflects the evidence that farmers equipped with information have stronger bargaining power and can access a number of markets at the same time. John and Oyebanji (2015) in their research on ICTs application for agricultural extension communication show that ICT tools (internet, e-mail, mobile phone, digital camera, Flash drive, CD-Rom and DVD) can increase the efficiency of agricultural information dissemination to farmers'. They buttressed further that ICTs application can promote communication between researchers, extension staff and their farmers'. They acknowledged that massive awareness on the use of ICTs for agricultural extension communication will change farmer frame of reference on new farming methods which will boost agricultural development in Nigeria. Department of Agriculture and Cooperation (2000), in their study on policy framework for agricultural extension in India, revealed that information technology revolution is unfolding and has a very high visibility. They buttressed further that harnessing information technology for agricultural extension communication will receive high point in the policy agenda. They added that high extensive use of modern information technology has promoted communication between researchers, extension staff and their farmers' clients to transfer technologies and information more cost effectively. Similarly, National Policy for

Farmers (NPFF) (2007) in India indicated that the potential of ICT would be harnessed by establishing Gyau Chaupels (knowledge centers) in villages. The National Policy for Farmers (NPFF) acknowledged further, that the common service centres (CSCs) of the Department of Information Technology, Ministry of Communications and Information Technology, Government of India and those set up by State Governments and Private Initiative Programme will be evolved for inclusive broad-based development. Last mile and last person connectivity would be facilitated with the help of technologies such as broadband, internet, community radio or internet-mobile phone synergies. Moreover ICTs studies focus on access and use issues. An unspoken assumption in many of these initiatives/studies was that increase access lead to more information. This in turn is expected to result in development outcomes (UNDP, 2001 and Yunus, 2006). In a related study, Richardson (2003) found that there are many uses of ICTs for facilitating communications, information and extension services in the context of improving rural livelihoods. The study further reveals that connectivity constraints in rural areas are still an enormous barrier to the uptake of ICTs. Equally, United Nations Development Programme (UNDP) (2001) establishes that information and communication technologies (ICTs) have been the key enablers to globalization and that the problem of underdevelopment is attributable to the inability of a large portion of the world's population to access and effectively use ICTs and the potential benefits they enable. Qarmar (2000) observed that advanced information technology is making headway in the area of rural agricultural development adding that a number of countries including Lao

people's Democratic Republic, Vietnam and Mali are experimenting with telecentres which have already been initiated in several West European countries. Virtual linkages are being established to bring research and extension together. He buttressed further that more than 30% of extension staff in Estonia use the internet and there are such programmes as "virtual" gardens or "virtual" farms on the World Wide Web. He affirmed that the main issue is how to harness the power of advanced information communication technologies for the benefits of both extension staff and farmers. Van de Ban and Hawkins (1996) stressed that information is an important resource in modern agriculture. The logic according to Hornik (1988) is overwhelming. An extension service that provides such information may enhance farmers' technical and locative efficiency. From time of Schultz (1964) transforming traditional agriculture both theoretical and empirical literature has strongly established that when a continuous stream of economically viable new technology is not available to the farmers, the return as investment in information flows to farmers is small or zero. Information and communication when use for agricultural extension communication will enhance the delivery information to farmers, improved the breadth and scope of agriculture, increase learning rates, encourage critical thinking and offer unlimited means of achieving agricultural goals (Osuagwu, 2009).

Conclusion

It is pertinent to note that ICTs can actually transform the agricultural extension service in Nigeria because ICTs tools (internet, search engine, telephones

(fixed and mobile), short message service, packet digital assistants, digital cameras, video, e-mail, computer, CD-Rom, DVD, flash drive and Contact Data Bases & Systems) have remarkable potential of increasing the speed of agricultural information dissemination to farmers. Also, ICTs have the capacity to increase farmers' knowledge and awareness on modern farming methods in spite of geographical location. Based on the above, the following recommendations are given:

1. Rigorous awareness campaigns should be undertaking to make extension staff and farmers aware of the existence of modern ICT tools so that they can utilize it.
2. Rigorous and intensive hand-on training on the use of ICTs for agricultural extension communication to all actors should be undertaken on regular basis.
3. Suitable content (texts, pictures, speech, audio and video) can be packaged on poultry farming, fisheries farming, irrigation farming and crop production by the agricultural research institutes in order to make them available on appropriate medium for interested farmers.

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