
Application of Information and Communication Technology (ICT) In Agricultural Extension Delivery System

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Abstract

The importance of ICT in agricultural extension delivery system cannot be overemphasized. ICT alters the ways in which time and distance affect research and productive activities such as agriculture and technology transfer. This paper presents the basic concept, origin, applications of ICT to agricultural extension and highlighted some challenges such as : poverty, poor access, connectivity, infrastructure and irregular power supply among others, while appropriate national ICT policy formulation, improved infrastructure, improved public power supply and adequate budgetary allocation were recommended, so that all the stakeholders in the agricultural sector can have access to agricultural information at all times, in order to attain the much desired sustainable agricultural productivity, food security, poverty reduction and improved livelihood of rural farm families.

Introduction

The world has been described as a global village due to the introduction of the latest inventions in Information and Communication Technology (ICT). The impact of ICT in all facets of life both within and outside Nigeria is as real as existence itself. Among the recent pressing issues relating to the phenomenon of globalization is an overwhelming call to address food insecurity and poverty. This is because many nations in the world are food-insecured and poverty-ridden and any nation that cannot feed her self cannot think of any development. The first step towards addressing these problems therefore, is to address the inherit problem in agriculture of which agricultural extension is a subset.

Agricultural extension as an aspect of agriculture is an informal or out-of-school education process that has as part of it's objectives to improve agricultural productivity (to attain food security) and livelihoods of rural farm families. To accomplish this objective, extension has as one of it's important task, the acquisition, exchange and sharing of information, knowledge and skills. Agricultural extension is essentially both education and communication whereby stakeholders are connected and exchange information, an important requirement for sustainable development. The

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paradigm shift in development concept towards participation and sustainability coupled with revolution in the information and communication technologies has provided opportunity for extension and rural communities to move into the information age (Arokoyo, 2005). In the developing countries, the situation of information flow among the actors of agricultural Research and Development (R & D) is such that global, regional and national research institutions (the developers of information) generate knowledge and technologies. These knowledge and technologies are then transferred to extension system (the carriers of information) for further diffusion and delivery to farmers (the users of information). (George,Morm and Quiton 2002).

Agricultural extension which depends largely on information exchange between researchers and farmers and among farmers and a broad range of other actors is an area where ICT is known to have significant impact. Extension workers who are the direct link between farmers and researchers and other actors in the agricultural knowledge and information system, are well positioned to make use of ICT to access expert knowledge or other types of information that could facilitate the accomplishment of their activities and those of the rural farmers towards enhancing increased agricultural productivity for food security and poverty reduction. Aspect of the responsibility of extension in this area, is the determination of the information need of the various actors and stakeholders in agricultural development, acquiring and organising the information items into usable forms and more importantly, communicating them through accessible and affordable means.

Arokoyo (2005) opined that the very weak linkages in the Research-Extension Farmer-input linkage system (REFILS) in Nigeria has been a major limiting factor to increased food productivity and sustainable development, because of this direct relationship between research and utilization of research findings, thus a strong linkage complemented by flawless information flow enhanced by the effective use of ICTs by the extension service will significantly boost agricultural productivity and improve rural livelihoods in developing countries.

The realization and thus, the need for ICT in teaching and learning seems to have globally become urgent, infact a necessity. Various governments of the world have come up with programmes and policies that will enhance the use of ICT in the business of teaching and learning as in agricultural extension services, where extension workers are teachers while farmers are learners. To this end, it will be seen that agricultural extension like other fields, has not been indifferent to the new call for ICT awareness in service delivery, because when not informed, one can be outdated and can hardly perform as every greatness is a product of information and makes one standout, while lack of information brings total destruction, neglect and breeds frustration. This was corroborated by Yekinni (2006) who opined that the focus of the advocate for the use of ICT by development specialists is that at the micro level, the poor can use ICTs directly to address their information needs, develop their own strategies and solutions for improving their lives and articulate their interests in societal processes and institution that affect them. What therefore is Information and Communication Technology (ICT)

Definition of Information and Communication Technology (ICT).

Information and Communication Technology (ICT) which can be seen as the study or business of developing and using technology to process information and aid communication has become within a very short time, one of the basic building blocks of modern society. Each of the concept are explained below with the meaning of ICT as seen by various authors also enumerated.

Information: Is a term with many meanings depending on the context. It is seen as organized data which is understood to have significance and meaning or data, that have been processed and presented in a form suitable for human interpretation, often with the purpose of revealing trends or patterns or an organized data that has been arranged for better comprehension and understanding (Ekwujuru 2006). Information as an integral part of ICT in whatever form is not useful or of value until it is accessed, relayed, transmitted, diffused and used or adopted.

Communication: Takes place when information is shared interchangeably between two or more individuals, the first individual referred to as the sender e.g Extension agent, while the second individual(s) is/are referred to as receiver(s) e.g farmers through a medium for the purpose of translating or transmitting relevant information. It is an interaction processes used to change and influence the learners behaviour towards intended outcomes.

Technology: Simply implies the application of knowledge to meet the goals, goods and services desired by people. It is the innovation, change or modification of the natural environment to satisfy perceived human needs and wants.

ICT: Ali (2004) described ICT as the scientific tool and techniques for developing, documenting and communicating information when needed, especially as they concern solving problems, providing need services in the various areas of human endeavours. According to Nigeria National policy for Information Technology (FRN 2001) ICT is any equipment or interconnected system or subsystem of equipment that is used in the automatic acquisition, storage, manipulation, management, control, display, switching, interchange, transmission or reception of data or information (FRN 2001).Nworgu (2006) defined ICT as a broad technology that gives support to the creation, storage, manipulation, retrieval, and communication of information using computers and telecommunication. Olorundare (2006) stated that ICT compasses different types of technologies which are utilized for processing, transmitting or communicating data or information. According to him, tools such as computer, internet, interface, boxes, e-mail, varieties of software and materials form important aspects of ICT. Meaning therefore that ,for the generation, processing and communication of information and impartation of knowledge, ICT incorporates such electronic devices as tape recorders, players, television, radio, computer, films, cinema, e-mail, internet, interface, boxes and

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all varieties of software and materials. These tools according to him, are important tools that no system of education can disparage.

The understanding of what ICT means underscores the fact that ICT is an indispensable educational tool which helps the resourceful, enthusiastic and dynamic teacher (Extension agent) to access and prepare resources for instruction and also helps the knowledge seeking students (farmers) to develop his potential, acquire more knowledge and enhance his attitude towards learning and tenaciously hold onto the skills he has mastered through ICT. By implication, mastery of ICT application by both the teacher and the learner makes teaching and learning less burdensome, easier and more interesting than the traditional classroom setting.

Application & Importance of ICT in Agricultural Extension

In view of one of the eight millennium development goals (MDGs) which is promotion of ICT (Obioma 2006) .It uses is necessary in agricultural extension.ICT prepares extension staff and farmers to be fully involved and be productive members of world that has been and will continue to be transformed by technology (Gregorian 2002). ICT potentials is developing rapidly and its usage is equally increasing and changing. ICTs especially the computer and internet are presently not only used as means for processing of information but also as medium for information dissemination and communication. In to days world, ICT is playing very important roles and making waves in almost all the field of human endeavor particularly in the field of education which agricultural extension is inclusive. There is an upsurge in the numbers of teachers, students and people (extension, worker, farmers and rural families respectively) from all works of life to become ICT compliant.

The potentials of ICT to make agricultural extension in developing countries more effective appear unassailable ,as there is changing paradigm in agricultural extension from the linear information flow pattern to pluralistic information flow with new actors emerging such as NGOs, international and national research institutes, universities and donor agencies.

Omotayo (2005) observed that agricultural extension systems in most developing countries are under-funded and have had mixed effects, much of extension information has been found to be outdated, irrelevant and applicable to small farmers felt needs, leaving such with very little information or resources to improve their productivity. ICT helps the extension system in re-orientating itself towards the overall agricultural development of small production systems, with the appropriate knowledge, small-scale producers can even have competitive edge over larger operations. When knowledge is harness by strong organizations of small producers, strategic planning can be used to provide members with least cost input, better storage facilities, improved transportation links and collective negotiation with buyers. In the National Information Technology Policy according to NITDA (2002) agriculture was recognised as one of the areas of attention for IT adoption, it states that, the nation shall use IT to re-engineer agriculture for the purpose 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. So also the National Telecommunication Policy has in one of its statements that government shall promote the use of internet in agriculture, education and research to encourage private sector participation. The agricultural extension system in Nigeria is an important actor in agricultural development efforts. Several dissemination methods have been used in the history of extension activities, these includes: the ministry- based conventional system, commodity- based system, university extension system and the current integrated agricultural development approach (Yeknni 2006). He further stated that the integrated approach which is co-ordinate through the project co-ordinating unit (PCU), uses the training and visits (T & V) delivery system, the system adjudged efficient and adequate both constrained by discontinuation of the counterpart funding by the world bank.

Some of the ICT tools that have and can be applied in agricultural extension service delivery in Nigeria as an innovative way of processing, exchanging and managing information and knowledge in order to reach and interact with people more effective wherever they may be included: Radio, Television, Telephone, Public phone call office, Television viewing centres, Camera, CD-Rom, DVD, Networking ,Internet services, Telecommunication (GSM), Short message service (GSM),Computers (hardware and software).

Omotayo (2005) also stated that the government in many developing countries have reduced their direct involvement in agric services provision, a challenge for agricultural extension services to remain relevant and effective in giving farmers varieties of information which are accessible, relevant, affordable and reliable. A reflection of an alternative source of information other a face-to-face, technology driven, donor promoted information service, with the following potentials include;

- To improve life style of rural populace and reduce rural poverty through information dissemination.
- To contribute to poverty alleviation, Food security ,job creation and informed decision.
- Ensure access to expert knowledge and information which are current and update.
- For faster and more efficient delivery of information.
- To bring about relevant and adaptable content.
- Fosters empowerment of men, women and youth.
- Increases rate of adoption of innovation's by late adopters and laggards of agricultural innovations.
- Spreading knowledge and information about good agricultural practices.
- Wider dissemination to people who are unreached or underserved and a deeper geographical penetration of rural areas.

Arokoyo (2005) had the following as potentials of ICT application in agriculture Extension.

- Enhance farmers ability to collate demands.

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- Collaborative learning.
- Exchange of time sensitive information e.g. market prices, disease outbreaks e.t.c.
- Makes extension systems and structure efficient.
- Engage farmers in accessing own needs and solution.
- Exploring alternative production technologies.
- Search, select and compile information for individual client.
- Community learning.
- Facilitate access to market and credits.

All these development will assist in achieving the elusive sustainable food security in Nigeria. Despite all these and many more potentials of ICT in agricultural extension, there are some inherent problems or constraints.

Omotayo (2005) stated that the most outstanding advantage of integrating ICTs and agricultural extension is that where extension services have not been effective in reaching the farmers, there is a great improvement as researchers now work in collaboration with extension and research findings are passed more efficiently to extension agents for onward transmission to farmers and It has addressed the following:

- Adoption and poor impact of new technologies in rural areas caused as a result of lack of appropriate information.
- Faster and easier access to records, vast store of information.
- Provided opportunity for distant education and training thus overcoming the problems of location. Despite all these and many more potentials of ICT in agricultural extension there are some inherent problems or constraints.

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Constraints and Challenges to the Adoption of ICTs in Agricultural Extension

Omotayo (2005) posited that even with the upsurge in recent years in several African countries in the use of ICT, it has witnessed persistent problems of access, connectivity, literacy, content, and cost. Others are pervasive poverty, poor infrastructure and man power. While Arokoyo(2005) stated that developing countries have adopted a variety of ICT tools but with some serious limitations among which are:

- Low level of ICT readiness by developing countries.
- Poorly developed ICT infrastructural facilities such as limited telephone lines most of which as still in the analogue mode.
- Erratic and unstable power supply and high cost of alternative power through standby generators.
- Limited and very high cost of telephone services.
- Lack of communication policy by government or policy inconsistencies which discourages private sectors investment.

- With respect to the internet, is the problem of content as majority of sites have no technical information on agriculture, marketing or those related to rural people.
- Inertia or resistance to changes: generally people tends to resist changes or innovations. Most extension workers have not yet acquired the necessary ICT knowledge and skills and so are not ICT compliant.
- Poverty: Due to the poverty level of majority of Nigerians, it may be quite difficult to afford the financial involvement in the procurement and accessing ICT facilities.

There exist a greater problem in the transfer of information from the research institution of the National Extension System and a greater one in disseminating to the information users (farmers among others). This was corroborated by George *et.al* (2002) that the research and development institutional infrastructure may be in place, but substantial blocks to information flow exist in the information hierarchy and knowledge remain inaccessible to the farmers especially in the rural areas. Much of the knowledge and technologies thus remains on the shelves in report, journal, books and electronic media because.... the intended users, the farmers have no say in their production and disposition. Thus a knowledge divide exists between the more affluent research institutions and the less affluent delivery (Extension) institutions and even a greater divide exist between delivery institutions and rural farmers. These challenges require a very robust medium that the new digital ICT format (e.g computer, CD-ROM and internet) can fulfill while a new vision to agricultural extension will be needed to accommodate the challenges (CTA,2002).

Conclusion

It follows conclusively therefore that, ICTs are information transmission technology built on the potentials of electronic communication devices such as computers and telecommunication equipment, for connecting and accessing various ends in information pathway. The important features of this system that makes it more useful to agricultural extension is the connectivity and communication services it provides. That is within an ICT system, there is a great opportunity of sharing of information among diverse source and ends the system serves (Omotayo 2005). Thus innovative technology has the potential of transforming communication in the rural areas in Nigeria and offer new option for communication management in diverse fields of endeavour, agricultural extension inclusive, if and only if there is universal access and all the constraints highlighted addressed. The potential for such universal access is limitless. Therefore advocates of improved agricultural extension system must ensure a greater understanding of ICT and its wide application in rural areas, that is, groups vast in the area of ICT must sensitize and catalyze other less vast stakeholders and generate ideas that would make ICT application more proactive and responsive to the need of rural areas in Nigeria. The challenges to extension institutions in the country therefore, is to adjust to the new situation and determine how to effectively use the available ICT

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formats to take care of the clientele's information needs and different communication problems (Yahaya2003), as well as determine the appropriate ICT format to use in the dissemination of information to them. All these are in a bid to improve agricultural productivity, enhance food security, reduce rural poverty and improve the livelihood of rural farm families.

Recommendations

Having enumerated the importance and challenges to the use of ICT in agricultural extension, the following recommendations are made to eliminate or reduce the latter and promote the former in order to ensure effective and efficient application of ICTs in agricultural extension for food security, reduce rural poverty and improve the livelihoods of rural farm families. They include:

- There must be an appropriate National telecommunication policy and regulation put in place that will encourage the use of ICTs.
- There must be a friendly policy environment that will encourage both Local and foreign investments in the ICT industry.
- Government should make ICT facilities more affordable particularly for agricultural extension through adequate budgetary allocation.
- There should be capacity-buildings, re-orientation and re-training of agricultural extension workers to bring up new breeds of change agents.
- The issue of universal access, connectivity and appropriate infrastructure for extension workers at the National, State and Local levels must be put in place and maintained for sustainability.
- There must be community sensitization to create awareness on ICTs potentials.

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