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Information Communication Technologies in Agricultural Extension Delivery of Agricultural Transformation Agenda

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Abstract

The study examined the role of information communication technologies in extension delivery of Agricultural Transformation Agenda (ATA) of Nigeria. The objectives were to: examine the agricultural extension delivery of ATA; identify ICTs relevant in agricultural extension and application of ATA; examine roles of ICTs in extension of ATA and identify constraints to the use of ICTs in extension delivery. The study is a review research which was based on secondary data collected from Federal Ministry of Agriculture and Rural Development, related literatures and internet. The study identified roles of ICTs in extension in ATA to include bridging the information gap for rural farmers with respect to innovative practices; farmers' access to government policies; farmers' access to information about input availability, credit facilities and weather vagaries. Some of the constraints to the use of ICTs were identified to include, erratic and fluctuating power supply, poor finance, lack of internet access in the rural areas and high cost of ICTs hard and soft wares. It was recommended that for more impact of the ICTs application in agriculture to be felt by extension agents and farmers alike, government and private sector investors should carryout massive human capacity development of agricultural extension officers in the various ICT tools which are applicable in agricultural sector, carry out awareness creation and sensitization of rural farmers of the opportunities they have in the use of ICTs, include the use of video-conferencing among stakeholders for meetings to reduce distant travels.

Keywords: Information Communication Technology, Agriculture, Transformation, Communication.

1. Introduction

Agriculture is a key component of Nigeria's economy, and contributes about 40.0% of the gross domestic product and employing about 70.0% of the active population (Federal Government of Nigeria, 2008). Agriculture accounts for the overwhelming majority of the rural employment (World Bank, 2011). The sector has the potential of improving the nation's economy.

Nigeria used to be a major player in the global agricultural market. She was the world's largest producer of groundnuts and palm oil in the 1960s, and the second largest exporter of cocoa. The country was self-sufficient in food production (Federal Ministry of Agriculture and Rural Development, 2013). Regrettably, the discovery of crude oil in the late 1960s and the huge financial gains from it made the government to shift its priority from agriculture to crude oil and relied on food importation as a means of feeding her citizens. The glory of agriculture however declined over the years hence Nigeria dominance in the export of groundnut was eclipsed by China, United States of America (USA) and Argentina as at 2008 Indonesia and Malaysia took over in palm oil Cote d'voire and Ghana also became the leading exporter of cocoa, while Mali and Burkina Faso led in cotton exports (Obiora 2014). The over-reliance on oil as the main source of foreign exchange led to the abandonment of agriculture. Nigeria became a net importer of food, spending $11 billion per year importing basic foods like wheat, rice, sugar and fish which can be produced locally. The Nigerian economy now solely relies on revenues accruing from the oil sector such

that instability in oil prices affects her a great deal just as it is being experienced now due to the fall in price of crude oil.

With Nigeria's huge agricultural potential of over 84 million hectares of arable land, of which only 40% is cultivated; a population of 167 million people making it Africa's largest market; and 230 billion cubic meters of water, making it one of the richest sources for agricultural growth in the world; the Government of President Good luck Jonathan embarked on a major transformation agenda on the agricultural sector (Federal Ministry of Agriculture and Rural Development, 2013). The goal of the Agricultural Transformation Agenda (ATA) are to add 20 million metric tone of food to the domestic food supply by 2015 and to create 3.5 million jobs, create wealth by making agriculture as a business and not a development programme, implement a full value-chain approach from farm to table and provide government enabled private sector-driven transformation (Adesina, 2014). The focus of the programme is to encourage the production of local staples to reduce dependence on food imports and turn Nigeria into a net exporter of food.

In order to achieve the twin objectives of employment generation and food security of ATA, the role of agricultural extension service cannot be over-emphasized. These roles involves the dissemination of information on agricultural technologies and improved practices to farm families and ensuring farmers' capacity building through the use of a variety of communication methods and training programmes (Agbamu, 2005). For effective communication, information and trainings of farmers and extension agents alike, there are various communication technologies available for use.

According to Abubakar (2010) in Nlerum (2014), Information Communication Technology (ICT) is defined as a term that encompasses a lot of activities involving the acquisition, storage, processing and dissemination of information through the use of appropriate software and hardware designed for the purpose. Arokoyo (2005) and Adejo, et al, (2013) defined ICTs as technologies that facilitate communication and the processing and transferring of information by electronic means to those that need them. ICT is an acronym that stands for Information and Communication Technology, which can be broadly interpreted as technology that facilitate communication and the processing and transition of information by electronic means (CTA, 2003; Salau and Saingbe, 2008).

Agriculture is one of the areas in which ICT is effectively applied particularly for the social and economic development of the Nigerian agrarian community (Omaku and Oyigbenum, 2012). Information and Communication Technology (ICT) in the agricultural sector facilitates knowledge sharing within and among a variety of agricultural networks including researchers, importer, exporters, extension services and farmers. ICT enables vital information flow by linking rural agricultural communities (Nwankwo, 2012).

Conceptually, extension education is a dynamic process which brings about changes in what people know, changes in how they react to situations and changes in what they can do with their hands (Adereti & Ajayi, 2005). The major concern of extension education is to help farmers to master the best way to handle their farms in order to improve their productivity and standard of living. Similarly, extension according to Adereti & Ajayi (2005) is a comprehensive programme of services deliberately put in place for expanding, strengthening and empowering the capacity of the present and prospective farmers, farm-families, other rural economic operators (processors, marketers, rural agro-industrialists, farm managers, farm labour force), farmer associations and communities entrepreneurial, managerial and communication skills that they need to succeed in farming and farm related occupations, through participator stakeholdership with researcher, policy makers, extantionists, educators, agro-investors, and farmers to put in place a strong programme in favour of improved agricultural production and farm investment environment.

Communication on the other hand involves all acts of transmitting messages to channels which link people to the languages and symbolic codes which are used to transmit message, the means by which messages are received and stored, and the rules, customs, and conventions which define and regulate human relationship and events (Adereti & Ajayi, 2005). Communication is a process involving the passing of messages through the use of symbols which all parties in the communication can understand. Communication process therefore involves actions, reactions and interactions. The basic elements of the communication process include the stimulus, source, message, medium, channels, receiver, feedback and noise. The importance of communication to extension work cannot be over-emphasized.

The problems of food insecurity, unemployment, rural poverty, and uncompetitiveness of Nigeria in the world global food market were not acceptable to the administration of President Dr. Goodluck Jonathan (Federal Ministry of Agriculture and Rural Development, 2013). This was why his government decided to initiate the Agricultural Transformation Agenda to address the problems. In

order to facilitate information delivery of the Agenda, ICT facilities were introduced into its agricultural extension component. The research problem of this study was to assess the ICT programmes of the agriculture extension aspect of the Agricultural Transformation Agenda. The research questions which were conceptualized to tackle this research problem are, what were the mechanisms of agricultural extension delivery employed by the Agricultural Transformation Agenda? What were the information communication technology tools that were applied by the Agricultural Transformation Agenda? What were the uses of information communication technologies in the extension programme of Agricultural Transformation Agenda? What were the constraints of the use of ICT in extension delivery of the Agenda?

In order to address the study research questions, the objectives of the study therefore examined the mechanism of agricultural extension delivery of the Agricultural Transformation Agenda, identified ICTs which were applied in agricultural extension component of the Agenda, examined the uses of ICTs in extension delivery of the Agenda and identified constraints to the use of ICTs in extension delivery.

1.1 Promoting the Use of Information and Communication Technologies (ICTs) in Nigeria's Agricultural Extension Service

According to Arokoyo (2006), the application of Information and Communication technologies (ICTs) in the extension delivery in Nigeria has led to the development and growth of the extension service. He opined that the effective use of ICTs has the potential to enhance the performance of Nigeria's extension service as it has allowed for pluralistic flows in an agricultural innovation system to ensure effective and efficient sharing and exchange of information, knowledge and skills among all stakeholders. He strongly recommended that the recent ICT initiatives in the country be properly managed, enhanced and sustained in a policy-friendly environment provided by government.

1.2 Agricultural Extension Delivery of Agricultural Transformation Agenda

The Agricultural Extension Transformation Agenda (AETA) operates on a pluralistic (both public and privately delivered services), knowledge-based, demand-responsive, market-oriented, and ICT-driven, value-chain approach, participatory extension and advisory service that is characterized by; assured and regular sources of funding, well-trained, and motivated staff, to effectively drive the Agricultural Transformation Agenda (Federal Ministry of Agriculture and Rural Development, 2013). There is a noticeable shift from the monopolistic national public extension system to a pluralistic system with the private sector now playing a major role in service delivery along value-chains.

For ease of work, the Government has provided certain logistics supports to extension which includes the provision of 1,215 motorcycles for field extension workers in the 36 states and Federal Capital Territory to significantly improve their mobility for better performance in extension services delivery, 3,000 knapsack sprayers in the training of young agriculturists as crop protection service provides who will render similar services to farmers in their various communities.

There was the audit of the extension field staff of the Agricultural Development Projects (ADPs) to determine the gaps in the extension agent/farm family ratio. This is with the view of achieving the recommended ratio of one extension agent to 800-1000 farm families. The critical mass of the field extension staff needed to effectively service Nigerian farmers and all other value chain actors has thus been determined. This now forms the foundation of the agricultural extension database in Nigeria.

The Research-Extension-Farmer-Inputs Linkage System (REFILS) which provides an important platform to bring together, all the key stakeholders in the technology generation, adaptation, dissemination, and utilization arena for the effective management of research and extension has now been resuscitated and institutionalized.

Capacity building for both farmers and extension agents in all the zones were carried out through: the zonal pre-season in-service trainings, zonal REFILS workshops, technical and steering committee meetings, and the specialized trainings along the targeted value chains. Over 4,800 farmers, producers, processors and 840 extension agents of various cadres were trained in 2012 (Federal Ministry of Agriculture and Rural Development, (2013).

Weekly radio and television programmes in English, Pidgin-English, and in local languages (Hausa, Igbo and Yoruba) in support of the Agricultural Transformation Agenda (ATA) in all the geo-political Zones were instituted.

In line with the global practice of pluralism in extension services delivery, and in pursuit of the governments' Public-Private-Partnership (PPP) policy, the following partnerships in support of extension services delivery were established; partnership with the Federal Ministry of Women Affairs on capacity building for women and unemployed youths; Federal Ministry of Education particularly Adult and Literacy Education; partnership with the Shell Petroleum Development

Company (SPDC) for the capacity building and empowerment of 60 women rice producers in Bayelsa State and partnership for extension support along selected value-chains in 12 States, (two per zone) in the first instance.

2. Materials and methods

The study is a review research which was based on secondary data from Federal Ministry of Agriculture, literatures of other related works, journals and the internet.

3. Results and discussion

3.1 Relevance of ICTs in Agricultural Extension

Selected ICT tools which are applicable in agricultural extension communication for rural development are radio, television, telephone, short message services, the Web, search engines, cameras, video, e-mail, computers, CD-ROM, DVD, web publishing, printed materials, photographs, questions and answer services (Lorliam, et al 2012). Arokoyo (2005) listed the usefulness of ICTs in agricultural extension to include capacity to reach a large audience, for example through the use of radio, television and internet which are effectively used for training and demonstrations. Also, television, Video, VCD, and CD-ROM are used in making the extension system and its structures more efficient through better management of information and scarce resources, for example, the use of data bases for Management Information System (MIS) and networking software. ICT is useful for the search and packaging of information on demand and for exploring of alternative production options and technologies for example, the use of search engines, the web and data bases.

ICTs is used for normal weather forecasts and as a warning system for disease and pests outbreaks and other disasters before they occur and also for the provision of timely and sensitive market information for example, the use of Radio, TV, and SMS (Salau and Saingbe, 2008). ICTs are important for networking among and between the key stakeholders in the Research-Extension-Farmers-Inputs-Linkage System (REFILS) for example the use of telephone, video, SMS. ICTs are also effectively used for community mobilization, learning and action, for example, radio, TV, public address systems and the Web. ICTs have become an increasingly powerful tool for improving the extension delivery of basic services and enhancing local development opportunities (Ezeh, 2013). Chavula (2014) includes that ICT is known to play significant roles in agricultural production in Africa.

Under the ATA programme, there is farmers' helpline which is CTA-supported and mobile phone-based. There is also the Nigerian Agricultural Question and Answer Service (NAQAS), with 9 collaborating research institutes scattered in all the agro-ecological zones of the country which is currently being operated by National Agricultural Extension Research Liaison Service (NAERLS) of Ahmadu Bello University (ABU). The main objective of NAQAS is to provide useful information on demand by all users of the service.

The ICTs infrastructures, both `soft and hardware developed for the service is quite rudimentary and thus the services are limited in coverage (geographical and number of clients). Consequently, up-grading of Nigerian Agricultural Question and Answer Service (NAQAS) platform to National farmers' helpline is being proposed. It is expected that when these farmers' helpline centres are established, that farmers and youths will be provided with e-extension support services to enable them acquire specific knowledge-related solutions to make responsible choices including access to production-enhancing inputs.

In 2010 alone, NAERLS-operated Nigerian Agricultural Question and Answered Service (NAQAS), received and processed almost 4,000 requests for agricultural information, of which 2,218 requests were received in the fourth quarter of that year alone. The various requests came from farmers, farmer groups, marketers, policy-makers in the agricultural sector, research scientists, and others interested in the events in the nation's agricultural sector. Results of the National Annual Agricultural Performance Survey have shown that the information so sought and disseminated have had tremendous impact on food production and farmers' productivity, processing, storage and marketing nationwide.

From the above discuss, ICTs are invaluable tools in extension under the ATA programme whose roles included but not limited to the following stated functions;

- They played the role of bridging the information gap for rural farmers with respect to innovative practices.
- Farmers have access to government policies.
- They also have access to information about input availability, credit facilities, and weather vagaries.
- There is ease in accessing markets information on the location of profitable markets and entry requirements.
- ICTs are effective tools for policy advocacy.

3.2 Uses of ICTs in Agricultural Extension of Agricultural Transformation Agenda

Under the Agricultural Transformation Agenda (ATA), there is a policy of Growth Enhancement Support Scheme (GES). The Growth Enhancement Support (GES), as a programme was launched to provide targeted support for seeds and fertilizer to five million farmers in the first year and 20 million farmers within four years. The GES programme was based upon technological, institutional, and financial innovations. The GES is an electronic wallet system where the database of 4.5 million farmers was developed in 2012 and was updated to 10 million farmers in 2013 (Federal Ministry of Agriculture and Rural Development, 2013). The E-wallet system was operated and implemented by Cellulant Corporation, a private sector contractor. Cellulant effected disbursement of $294 million of subsidies on behalf of the Federal Government of Nigeria and State Governments directly into the e-wallets of farmers. Farmers used $55 million of the subsidy deposits. Agro-dealers received $50 million as matching funds from farmers and $192 million of unused funds was returned to Government coffers in the first season (Federal Ministry of Agriculture and Rural Development, 2012).

The E-wallet was developed using mobile phones, to deliver seeds at no cost and 50% subsidy on fertilizers, for a maximum of two bags, to farmers. Electronic vouches for seeds, agro chemicals and subsidized fertilizers were sent to farmers on their mobile phones. The vouchers were then used as cash to redeem farm inputs from registered agro input dealers across the country. Nigeria is the first country in Africa to launch an electronic wallet system for farmers to get subsidized farm input (Adesina, 2014).

Adejo et al (2013) confirmed that ICTs gave a stream of opportunities for rural farmers irrespective of their sex, to source variety of information on how best to go about their agricultural production for maximum yield and profit, since agriculture employs 75% to 80% of the rural workforce. Similarly, Adeniji (2010) affirmed that ICTs delivered useful information to farmers in the form of crop care and animal husbandry, fertilizer and livestock inputs, drought mitigation, pest control, irrigation, weather forecasting, seed sourcing and market prices.

Also, for case of tracking the areas under cultivation in crop production, six (6) staff from the Federal Ministry of Agriculture and Rural Development (FMARD) were trained in the use of Global Positioning System (GPS) to survey and record actual cropped areas in hectares. GPS is a space-based satellite navigation system that provides location (latitude, longitude and altitude) and the current time information of a particular point in all weather, anywhere on the surface of the earth (Michael et al, 2002 in Obabire & Fapojuwo, 2014). According to John (2014), GPS receive their information from multiple space-based satellites at any given time or location. Depending on the task, they assist framers in surveying, treating and managing their land, crops and livestock (Obabire & Fapojuwo, 2014).

In the fisheries sector, forty (40) fisheries officers were trained in Geographic Information Systems (GIS) to enhance fisheries data collection and management. The GIS is a set of computer tools designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced information (FSIRI, 2008). Information technology has made a substantial impact on farming, particularly with the use of GPS in conjunction with GIS tool to obtain precise information on existing agronomic management activities by implementing them at a subfield scale (Esiri, 2008).

The livestock sector also made use of National Animal Diseases Information System (NADIS) quarterly e-newsletter to inform members of the veterinary services about national disease status and other relevant programme of the Federal Department of Livestock (FDI).

Furthermore, meetings were also held with stakeholders in all the value chain to discuss the way forward for targeted achievements. Weekly radio and TV programme in English, Pidgin English and in local languages (Hausa, Igbo and Yoruba) were broadcasted in support of the Agricultural Transformation Agenda (ATA) in all the geo-political zones. The importance of the use of radio and television programmes as means of extension delivery cannot be overemphasized. Radio is a particularly useful mass medium for extension. Radio is one of the best media for creating awareness of new ideas to large number of people and can be used to publicize extension (Leeuwis & Ban 2004, Laogun, 2005 and Food and Agricultural Organisation, 2015).

However, there are a number of limitations to the use of radio in extension work. Batteries are expensive and often difficult to obtain in rural areas, and there may be few repair facilities for radio sets that break down. From the listener's point of view, radio is an inflexible medium: a programme is transmitted at a specific time of day and if a farmer does not switch on the radio in time, there is no further opportunity to hear it. There is no record of the message. A farmer cannot stop the programme

and go back to a point that was not quite understood or heard properly, and after the broadcast there is nothing to remind the farmer of the information heard.

A further limitation is the casual way in which people generally listen to the radio. They often listen while they are doing something else, such as eating, preparing food, or working in the field. For this reason, radio is not a good medium for putting very long, complex items of information. A popular format in many countries, therefore, is for short items of farming news and information to be presented between musical records. Radio drama, in which advice is given than a single voice giving a formal talk. Finally, there is little feedback from the audience, except with a live broadcast where it is possible for listeners to telephone in their questions or points of view directly to the programme presenter.

Television with its sound and vision power is useful for extension work in demonstrating technologies and video training (Omotayo, 2005). Like the radio, it can also be an instant medium, transmitting information directly to a mass audience. Television signals can be broadcast from a land-based transmitter, by satellite or through cables (Food and Agricultural Organisation, 2015). However, in many countries, television transmission and sets are still restricted to urban areas, and the potential of television for rural extension will remain low until sets become more widely available. Television sets are much more expensive to buy and repair than radios, and programme production costs are also far higher. Where television has been used for rural extension communication, access and impact have been increased by group viewing followed by discussion.

3.3 Constraints to the Use of ICTs in Extension Delivery of Agricultural Transformation Agenda.

Major constraints to the use of ICTs in extension delivery include but not limited to lack of sufficiently trained computer personnels, lack of confidence in operating modern ICTs, erratic and fluctuating power supply, poor finance, lack of internet access in the rural areas and high cost of ICTs hard and soft wares (Salau, et al, 2014). Similarly, Chete & Fashioyiro (2014) affirms that constraints to use and adoption of ICTs include poor knowledge of ICT application, negative attitude to infrastructures, poor service provision, lack of motivation, lack of mobile phones, poor extension agents skills, lack of insight on the government objectives, low economic status, low educational level, high cost of ICT equipment, inadequate electricity supply, distant location of ICT facility, poor understanding on use of ICT tool (mobile phone) for Agricultural transactions.

4. Conclusion and recommendations

The importance of ICTs in improvement of agriculture as a business cannot be over-emphasized. The study showed that ICT are valuable tools and if adopted and used efficiently in the Agricultural Transformation Agenda (ATA), will transform the agricultural system of Nigeria for the better. It is recommended that to enhance adequate extension delivery in the ATA program0me, the extension sector should be adequately funded and capacities of extension staff be adequately upgraded to face the challenges ahead in the delivery of services in the ATA programme. Also the intensification of awareness creation and sensitization of rural farmers of opportunities inherent in the use of ICTs are recommended. Establishment of national farmers helpline centres in all the geo-political zones and inclusion of the use of video-conferencing among stakeholders for meetings to reduce distant regular travels are also recommended.

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