

New Media and Sustainable Agricultural Development in Nigeria

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Abstract

The Nigerian agricultural sector over the years has witnessed efforts at transforming its operations. The use of ICT stands out as the most recent strategy deployed to revolutionize agricultural activities. Consequently, the use of mobile phones by Nigeria farmers has emerged as important in enhancing agricultural productivity. This paper examine whether Nigeria farmers' mobile phone use have brought about any significant difference in agricultural information exchange and productivity. Semi-structured interview and focus group discussions were used to collect data from 50 farmers, 15 extension workers, and 40 farm produce sellers to understand their engagements with and use of mobile phones for agricultural development. Results indicate that 65% of the extension workers report increase in effectiveness and area of coverage through mobile phone use; 73% of farmers use mobile phones for agricultural information search and exchange; while farm produce merchants report increased income of about 56% through mobile phone use.

Keywords: New Media, Sustainable, Agricultural productivity, Unemployment, Economic Empowerment.

Introduction/Background Of Study

The Nigerian economy was previously almost entirely dependent on agriculture for many years before oil was discovered in 1956. In other words, prior to the discovery of petroleum in Nigeria, agriculture was the mainstay of the Nigerian economy. Agricultural enterprise such as cocoa, groundnut, oil palm and cotton production accounted for a large chunk of foreign exchange earnings for Nigerian, thereby showing the important role agriculture has played and continues to play in the history and development of Nigeria. Global agricultural activities have become sophisticated and knowledge management according to UNDP Ethiopia (2012) can play a pivotal role in enhancing agricultural productivity and addressing the problem of food insecurity. If properly managed, it enables appropriate knowledge and information to reach knowledge intermediaries and smallholder farmers timely. Such delivery of knowledge and information undoubtedly minimizes the risk and uncertainty smallholder farmers face from production to marketing of their produce. But, to effectively engage in agricultural knowledge management, adequate mechanisms are needed for generating, capturing, and disseminating knowledge and information through the use of effective processes and institutional arrangements.

After the creation, sourcing or accumulation of knowledge, the knowledge has to be disseminated to users to support the innovation process. Information and Communication Technology (ICT) can play a critical role in facilitating rapid, efficient, and cost effective knowledge management. Accordingly, it has been widely documented that since Nigeria's telecommunication industry was liberalized in the year 2000, there has been an overwhelming increase in the rate of penetration of mobile phones from virtually zero to as high as 49% in 2009 (Pyramid, 2010). Such increase in access and use of mobile phones included rural areas, despite the low-income status of many rural households.

Consequently, a new paradigm of agricultural development is fast emerging; in both developing and developed countries, the overall development of rural areas is expanding in new directions - old ways of delivering important services to citizens are being challenged; and traditional societies are being transformed into knowledge societies worldwide. The report of the "Task Force on India as Knowledge Superpower (GOI, 2001) emphasized the necessity of developing the capacity to generate, absorb, disseminate and protect knowledge and exploit it as a powerful tool to service societal transformation. Information and Communication Technology (ICT) is generally seen as an important means of achieving such a transformation. When used as a broad tool for providing local farming communities with scientific knowledge, ICT heralds the formation of knowledge societies in the rural areas of the developing world. However, this can only be realized when knowledge and information are effectively harvested for overall agricultural and rural developmental needs. This can only be achieved through the media of communication, which has also been transformed from traditional to mass media and now ICT/new media. The development of precision farming in Nigeria emphasizes knowledge-intensity; hence the agricultural paradigm in the developing world will have to be recast to take advantage of knowledge availability to achieve multiple goals of income, food and jobs. In that case, agricultural extension in the current scenario of a rapidly changing world, has been recognized as an essential mechanism for delivering knowledge

(information) and advice as an input for modern farming (Jones, 1997). Agricultural information interacts with and influences agricultural productivity in a variety of ways. It can help inform decisions regarding land, labour, livestock, capital and management skills. Hence, the creation of agricultural information (by extension services, research, education programmes and others) is now often managed by agricultural organizations that create information systems to disseminate information to farmers so that farmers can make informed decisions in order to take advantage of market opportunities and manage continuous changes in their production systems.

The actual information need of the rural farmer is usually in accordance with the challenge(s) confronting them at the time. Their needs could be how to control pest and diseases, environmental hazards, seedlings, preservation, finance and/or non-access to loan. This aligns with the saying that information is power. Consequently, when the information required by rural farmers is packaged in the language they understand and made available at the appropriate time, it will enhance agricultural productivity and ultimately food security. The drive to achieve food security, rural economic empowerment and national development objectives make the strengthening of agricultural production, storage and marketing, as well as research and development imperative. Amobi (2010) notes that national food security programme according to the Federal Ministry of Agriculture and Water Resources is to ensure sustainable access, availability and affordability of equality food to all Nigerians and for the country to become a significant provider of food to the global community. As a result, the Federal Government initiated the Growth Enhancement Support Scheme (GESS) to actualize the Agricultural Transformation Agenda (ATA) of the present Nigerian administration.

GESS is aimed at subsidizing the cost of major agricultural inputs like fertilizer and seedlings. The programme started in May 2012, and has so far registered about 14 million farmers throughout Nigeria for direct redemption of farm inputs through the e-wallet system (communicating with rural farmers via mobile phones, precisely SMS). This shows that ICT/new media has a significant role to play in evolving such a paradigm (Meera, Jhamtani & Rao, 2004). This study therefore examines the role of the new media in the effort to achieve a paradigm shift in agricultural development and rural economic empowerment in Nigeria.

Objective Of The Study

The main objective of this study is to examine how the potentialities of the new media can be brought to bear in rural economic empowerment efforts and the development of the Nigerian agricultural sector.

The specific objectives of this study are:

1. To investigate how rural farmers obtain information about how and where to get farm inputs, credit, modern farm tools and livestock etc.
2. To find out whether rural farmers belong to cooperative societies and the benefits they could derive from belonging to such societies.
3. To examine if members of rural farmer's cooperative societies in Nigeria use mobile phones in the sourcing, distributing and/or sharing of agricultural information.
4. To identify the views of rural farmers on the usefulness or otherwise of mobile phone use in their day-to-day agricultural activities.

Review Of Related Literature

Mobile communications as a tool for enhancing and achieving sustainable agricultural development in developing countries like Nigeria has attracted the interest of various scholars. This study therefore reviewed literature related to the field under study.

ICT in the Nigerian Agricultural Sector: A Paradigm Shift

Discussing agriculture elsewhere in Africa, Jama, Stuth, Kaitho, Ali and Kariuki (2007) observed the need of farmers for a comprehensive agricultural information system focusing on markets, farming conditions, disease incidence, water supplies and conflict hotspots has been identified by most governments, NGOs and international agencies the world over within Eastern Africa. This situation is similar everywhere in Africa, including Nigeria.

In virtually every sphere of life in Nigeria, there are noticeable changes and transformations brought about by the emergence of Information and Communication Technology (ICT) and the agricultural sector is not left out. In Nigeria, ICT infrastructure is spring up fast and Nigerians are increasingly getting used to computing devices, digital imaging, the Internet and Wide Area Networking (WAN), and mixed media. For example, use of radio for internet access and Internet radio, SMS services and WAP (Wireless Access Protocol) based Internet access

using cellular telephony is now common. Also embedded use of micro-processors, computing devices and applications, digital media in processes and systems for data and information management communications are not left out.

The application of ICT in agriculture is becoming increasingly important. Electronic Agriculture popularly known as E-Agriculture is an emerging field focusing on the enhancement of agricultural and rural development through improved information and communication processes. More specifically, E-Agriculture involves the conceptualization, design, development, evaluation and application of innovative ways to use Information and Communication Technology (ICT) in the rural domain, with a primary focus on agriculture. E-Agriculture is one of the action lines identified in the declaration and plan of action of the World Summit on the Information Society (WSIS). The main phases of the agriculture industry include: crop cultivation, water management, fertilizer application, pest management, harvesting, post-harvest handling, transport of food products, packaging, food preservation, food processing/value addition, quality management, food safety, food storage, and food marketing. All stakeholders in the agriculture industry need information and knowledge about these phases to manage them efficiently. Any system applied for getting information and knowledge for making decisions in any industry should deliver accurate, complete, concise information in time or on time. The information provided by the system must be in user-friendly form, easy to access, cost-effective and well protected from unauthorized accesses. The information could be packaged in the form of recorded text messages, drawings, photographs, audio, video, process descriptions, and other information in digital formats, to mention but a few.

Generally, there are three areas in which ICT can contribute to the agricultural sector:

- Improved management of data and information
- Improved services including marketing
- Improved learning and capacity development

Improved Management of Data and Information:

Accurate and precise agriculture data and information is required for policy development, strategy formulation, monitoring growth and evaluating impact of policies and programmes for growth and sustainable development of the sector. This data and information is required at various levels – National, Regional/State, Community, Village, Household and Farm.

The purpose of managing this data and information include:

- Planning, implementing and monitoring agricultural development programmes
- Planning and monitoring farm production at various levels including villages and farms
- Planning and monitoring animal health, farming conditions, bio-safety and food safety
- Planning and monitoring extension and capacity development
- Administration, budgeting and accounting of State and Public Enterprises and Services
- Farming and farm products marketing and supply chain management
- Planning livestock research.

The ultimate objectives of managing agriculture data and information would be related to making of decisions for a given purpose at a given level. For example, planning, implementing, monitoring and animal improvement programme through selection, crossbreeding and artificial insemination at national, state, local or village level, ICT can be used at each level. Starting from the village, hand held devices such as the Computer and Personal Digital Assistants (PDAs) can be used to maintain owner and animal data and information. Information systems, using a Computer and a Smart Card can be designed to inform the animal owner the expected next heat of the animal. The same system can be used to plan the rounds for insemination, making a passive insemination system into an active one and enabling monitoring of fertility at the animal level and through aggregation at various other levels such as village, inseminator and even the sire (Maru, 2006). At the Artificial Insemination center, the aggregated data can be used to plan the production and supply of semen and other materials needed for an insemination programme. For an animal-breeding programme at District or State level, the data will enable monitoring of pedigree, progeny, and improvement in productivity. As seen in many countries, especially Australia and Israel, an efficient animal recording system is a key to rapid animal improvement and new ICTs offer an appropriate opportunity for developing countries to implement such programmes.

These information systems will need greater coordination and management as also development of public databases, decision support and knowledge based tools. What is really needed is greater awareness and sensitization among policy makers about the potential of ICTs and improved information systems in contributing to the development of the agricultural sector, appropriate policies and investment in programmes that are aimed to improve data and information systems and the ability to use information in policy and strategy development and implementation. However, most development agents use mobile phone's SMS capability (text messaging) as one of the new media feature that is easily accessible and affordable in Nigeria. This feature tends to cut across

literacy and poverty barriers to disseminate needed agricultural information to rural farmers, extension officers and farm produce sellers. Specifically, mobile phones have the following advantages over other new media, as well as the traditional mass media:

- Accessibility and affordability of mobile phones by majority of farmers.
- Produce exact duplicates of such information at significantly lower cost.
- Instant delivery of information and knowledge rapidly over large distances through communication networks.
- Develop standardized algorithms to large quantities of information relatively rapidly.
- Achieve greater interactivity in communicating, evaluating, producing and sharing useful information and knowledge.
- Deliver personalized information to individual owners.
- Provide other functions such as voice communication.

Agricultural Transformation Agenda (ATA) in Nigeria: Achievements so Far

Agriculture in Nigeria is predominantly practiced in the rural areas; hence, there is the need to ensure that farmers in the rural areas get access to farm input such as fertilizers, seeds and information to enhance their productivity. In recent years, majority of the governments and donor agencies operating in the region have shown a renewed interest in improving the livelihoods, living conditions and the economic wellbeing of the rural communities (Jama *et al.*, 2007). The global revolution in information and telecommunication technology have created an opportunity to remedy the situation and to assist farmers, livestock producers, development practitioners, researchers and policy makers to make informed decisions and identify appropriate choices and strategies to cope with and mitigate the effects engendered by constraints in the rural agricultural sector.

Currently, the Federal Government of Nigeria is implementing an Agricultural Transformation Agenda (ATA) through a set of complementary programme interventions which aim to solve, in a holistic and integrated manner, the constraints and weaknesses that have held down agricultural development in the country for a long time. The government ATA programme seeks to grow and develop agriculture as a business and thereby create jobs, assure food security, promote private sector investments for wealth creation and maximize agriculture sector contribution to the country's economic growth.

The transformation agenda sets out to create over 3.5 million jobs in the agricultural sector, from rice, cassava, sorghum, cocoa and cotton value chains, with many more jobs to come from other value chains under implementation. The agenda aims to provide over 300 Billion Naira (US\$ 2 billion) of additional income in the hands of Nigerian farmers. Over 60 Billion Naira (US\$ 380 million) is to be injected into the economy from the substitution of 20% of bread wheat flour with cassava flour. In total, the agricultural transformation agenda will add 20 million metric tons to domestic food supply by 2015, including rice (2 million metric tons), cassava (17 million metric tons) and Sorghum (1 million metric tons).

The major implementation strands for the ATA include:

- Growth Enhancement Scheme (GES) - designed to enhance agricultural productivity through timely, efficient and effective delivery of yield-increasing farm inputs; it is also aimed at subsidising the costs of major agricultural inputs, such as fertiliser and seedlings for farmers;
- Staple Crops Processing Zones (SCPZs) – designed to promote private sector investments for agribusiness development and establish public-private partnership framework for the sustained development of commodity value chains;
- Nigerian Incentive-based Risk Sharing for Agricultural Lending (NIRSAL) – designed to derisk agricultural financing by banks and enhance the flow of credit to agricultural sector value chain actors;
- Commodity Marketing Corporations (CMCs) – aimed at improving the marketing environment for agricultural commodities and assuring sustainable pricing and market development.

Among the ATA components, the Growth Enhancement Support Scheme (GES) provides a unique connecting link as it targets the farmers directly with critically needed modern farm inputs on real-time basis. Understandably, the implementation of GES seems to be ahead of other components because of the primacy and urgency of boosting farm-level outputs and productivity. In July 2012, the Federal Government introduced the Growth Enhancement Support Scheme (GES) which is designed to deliver government subsidized farm inputs directly to farmers via GSM phones. The GES scheme will be powered by eWallet, an electronic distribution channel which provides an efficient and transparent system for the purchase and distribution of agricultural inputs based on a voucher system. The scheme guarantees registered farmers eWallet vouchers with which they can redeem fertilizers, seeds and other agricultural inputs from agro-dealers at half the cost, the other half being borne by the Federal Government and State Government in equal proportions.

As part of the GES Scheme, the Federal Ministry of Agriculture led by the Minister, Akinwumi Adesina, recently announced that the ministry will equip millions of farmers in the rural areas with mobile phones. According to the Minister, the project will link farmers directly to government and vice-versa so that government will be able to monitor the progress of farmers, as well as disseminate valuable information to them. He argued that the eWallet project will serve as an avenue to educate, inform and communicate with farmers in rural areas across the country on the latest and best agricultural practices, as well as the current prices of commodities in the market. The skepticism amongst Nigerians is understandable considering the fact that a lot of agricultural policies in the past have been an avenue for corruption and misappropriation of funds; however, this could bring about a revolution in the agricultural sector if due process is followed in the implementation and execution of the project. The scheme seeks to provide targeted support for seeds and fertilizers to 5 million farmers per year or 20 million farmers within four years. According to the project appraisal, GES would generate 5-10 times returns in increased production with the overall benefit-cost ratio estimated at about 16:1.

The targeting of farmers is based on the farmer registration exercise being conducted throughout the country. A recent stock-taking by the Federal Ministry of Agriculture and rural development shows that in 2012, 1.5 million smallholder farmers got their subsidized seeds and fertilizers using their mobile phones. It was also stated that 10 million farmers have been registered and now have identity cards which allow the use of biometric information to target them more effectively. Also, over 3.4 million farmers are said to have received their subsidized inputs in 2013, with the expectation that close to 5 million farmers will be reached by the end of the dry season in 2013.

In order to provide informed and evidence-based contributions for improving the performance of the scheme and correcting any shortcomings, APRNet is hosting a blog discussion around the following questions: Give your comments on observed shortcomings, lapses or constraints have been observed since the start of implementation – with regards to appropriateness of the design, its adequacy, farmers registration, voucher mechanism, service delivery chain –electronic notification, input dealers, farmers, transport, etc.? (APRNet Blog, 2013).

The e-discussion forum will achieve greater participation and networking in APRNet. It will improve the exchange of ideas and sharing of experiences on a real-time basis. The observations, comments and recommendations in the blog discussion will be synthesized into *APRNet Blog Discussion Summaries* and channeled as APRNet inputs into the decision-making and programme monitoring processes of the federal ministry of agriculture and rural development (APRNet Blog, 2013).

Theoretical Framework

This study is anchored on Hermann Günther Grassmann's extension theory which posits that increased adoption rates would occur as information about the innovation is communicated through farmers' social networks. The theory was used to evaluate how the new media aids in achieving sustainable agricultural development in Nigeria (Hermann, 1844). Traditionally, it was assumed that all farmers would eventually see the benefit of new innovations and thus adopt them. Therefore, views and measures of the success of an innovation were based on the level at which an innovation was adopted. A further assumption was that increased adoption rates would occur as information about the innovation was communicated through farmers' social networks. This organized and formal process of actively communicating such information was called extension, basically the process of changing voluntary behaviour via communication. The goal of extension is to determine how to convey information regarding a new innovation to a certain population (such as farmers) so that they will adopt it. The challenge of extension is to design an appropriate communication channel (Röling, 1988).

Over time, the term agricultural extension has also been used to collectively include any advisory, consulting, technology transfer, research, training, marketing, industry development, learning, change, communication, education, attitude change, collection and dissemination of information, human resource development, facilitation, or self-development activities that are undertaken with the aim of bringing about positive change on farms and in agriculture (Fulton, Fulton, Tabart, Ball, Champion, Weatherley, & Heinjus, 2003).

Methodology

This study was designed as a survey. Data for the study was collected through semi-structured interviews and focus group discussions since some respondents were not literate. Two states were used from South-East Nigeria which are Enugu and Anambra states. Specifically, Nsukka and Omor were the two towns studied in these states respectively. These towns were chosen because they are predominantly agricultural areas. Extension workers and cooperative society officers in the local government areas helped to identify, reach and communicate the farmers. Focus group discussion was used to elicit information on identified challenges and how information was

accessed to meet these challenges. Purposively, data were amassed from farmers (N= 50), extension workers (N=15), and rural farm produce dealers (N=40) to understand their engagement with and use of mobile phones for agricultural development. 23 farmers (male and female) formed the focus group from Omor, while the representatives of 15 cooperatives formed that of Nsukka.

Data Presentation and Analysis

Table One: Respondents' Sources of Information Concerning Agriculture

Media of Communication	Nsukka	Omor
Internet	2%	-
Mobile Phone (GESS/E-wallet)	52%	56%
Fixed Phone	-	1%
Television	3%	2%
Cooperative societies	28%	32%
Radio sets	9%	5%
Agric Extension Workers	6%	4%
Total	100% (N = 48)	100% (N = 57)

The data in table one shows that more than a half of the respondents receive information concerning agriculture through their mobile phones, followed by 28% and 32% from Nsukka and Omor respectively who receive such information via cooperative societies and those (9% and 5% from Nsukka and Omor respectively) who receive agricultural information through their radio sets. The table also shows that 6% and 4% of the same respondents from Nsukka and Omor respectively receive such information through agric extension workers, 3% and 2% receive such information via their television and lastly 2% of the entire respondents from Nsukka receive such information through their Internet. This suggests that majority of the respondents receives information concerning farming via GESS/eWallet programme (mobile phones), followed by cooperative societies, radio sets, and agric extension workers.

Table Two: Extent of belonging to Cooperative society

Media of Communication	Nsukka	Omor
Member	65%	59%
Non-Member	35%	41%
Total	100% (N = 48)	100% (N = 57)

The data in table two shows that 65 percent of the respondents in Nsukka belong to one cooperative society or the other, while 35 percent did not belong to any cooperative society. The table also reveals that 59 percent of the respondents in Omor belong to one cooperative society or the other, while 41 percent did not belong to any cooperative society. The result therefore suggest that majority of the respondents belong to one cooperative society or the other.

From the focus group discussions, it was discovered that, there are 8 and 15 viable cooperative societies in Omor and Nsukka respectively. Respondents believe that farmers benefit from cooperative societies in many ways. For instance;

- They agreed that cooperative societies help them gain access to information and farm equipment like tractors, as well as negotiation for farm land.
- One group said they make monthly thrift for savings and one can borrow from it and at the end of the year, they share the money and the interest. Such loans they insist help them in their farm work.
- It is through cooperatives that some NGOs/Government assists them through evening programme for illiterate ones, as well as seminars and workshops to improve their farming methods and how to gain access to loan, as well as rent machines for planting at subsidized rates.

This agrees with Nwanze (2010) and Attwood and Bavista (2002), who emphasized that some developmental goals in agriculture are best achieved by cooperatives and similar organization. These cooperatives help people cope with economic, social and environmental problems.

Table Three: Respondents' use of mobile phones for agricultural activities

Mobile Phone access and use	Nsukka	Omor
Yes	93%	88%
No	7%	12%
Total	100%(N = 48)	100%(N = 57)

The data in table three shows that 93 percent of the respondents in Nsukka have access to and use mobile phones for agricultural activities. The data also reveals that 88 percent of the respondents in Omor have access to and use mobile phones for agricultural activities. This suggests that majority of respondents have access to and use mobile phones for agricultural activities.

Respondents' perception of the usefulness of mobile phone in agricultural activities

- Better access to information
- Better access to extension services
- Better market links and distribution networks
- Better access to finance

From the qualitative data above, the most widely used Mobile Applications for Agricultural and Rural Development (M-ARD) apps provide access to valuable information - a crucial function because asymmetrical access to information is a weakness of rural markets in developing countries. M-ARD apps also provide farmers and rural residents with timely access to extension services, such as advice on agricultural production, marketing, technology, food security, and nutrition. In addition, M-ARD apps have expanded access to finance and insurance products in rural areas. M-ARD apps also have significant qualitative impact, though such benefits are harder to assess objectively and largely depend on the local context.

Conclusion

From all indications, it appears that the new media can make a powerful contribution to agricultural development. Not only can the ICT/New media be applied in virtually every sphere of agricultural production and farm management; it also has the capacity to transform production and marketing and, even more importantly, improve the flow of information and knowledge within the sector. Farmers of course need physical inputs at every stage in the value chain, but they also need information, which can be more readily or efficiently obtained through the application of ICT. This means that the transforming potential of ICT can reach and positively impact on the different segments and activities of the agricultural sector. ICT offer innovative, dynamic and interdisciplinary services. These new services could raise incomes and create more opportunities for people in rural and underserved communities in developing countries, as well as stakeholders throughout the ecosystem. This study therefore concludes that the new media, especially mobile phones use for agricultural activities can contribute and is indeed contributing significantly towards achieving sustainable agricultural development.

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