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FARMERS' USE OF MOBILE PHONE-BASED SERVICES FOR ACCESSING AGRICULTURE AND RURAL DEVELOPMENT INFORMATION IN NORTHERN ZONE OF EDO STATE, NIGERIA

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ABSTRACT
Telephone-based services are becoming widespread and could be useful in agriculture and rural development (ARD). This study assessed the use of mobile phone based services (MPBSs) among farmers in the northern zone of Edo State. A multistage sampling procedure was used to draw a sample of 150 respondents. Data on the objectives were obtained with structured questionnaire and analysed using frequency counts, percentages, mean, Likert scale and Spearman rho correlation. Results show that majority of respondents were males (72.7%), within the age group of between 51-60 years (53.3%), married (80.0%), had family size of 5-8 persons (62.0%) and had telephones (94.7%). The frequently accessed and regularly used MPBS were phone calls ($\bar{x}$=2.57; 3.39) and SMS ($\bar{x}$=2.28; 3.29).The ARD information frequently accessed using MPBSs included farmers' meetings ($\bar{x}$=2.26), planting/breeding materials ($\bar{x}$=2.17), community meetings ($\bar{x}$=2.56), warnings and alarms ($\bar{x}$=2.47) and community projects ($\bar{x}$=2.52). Constraints to usage of MPBSs included shortage of capital to recharge, dearth of knowledge on application of MPBSs and poor electricity supply There was significant correlation between respondents' age (r=-0.401), education (r=0.413) as well as farming experience (r=-0.229) and frequency of usage of MPBSs to access ARD information. It was concluded that access and usage of mobile phone based services was low due to several constraints. ARD information should be disseminated using MPBS and farmers' sensitization and capacity building on MPBSs is necessary to improve extension delivery.
Keywords: Telephone services, Agricultural development information, Mobile phone based services.

INTRODUCTION

The agricultural production system in Nigeria is characterized by a disproportionately large fraction of the agricultural output in the hands of smallholder farmers whose average holding is about1.86 hectares (Apata, Sanusi and Olajorin, 2016). Also, there is very limited access to modern improved technologies and their general circumstance does not always merit tangible investments in capital, inputs and labour**.**

The bulk of the poor, some three-quarters according to a World Bank estimate, live in rural areas where they draw their livelihoods from agriculture and related activities (Kotze, 2003). Evidently, development, food security and poverty alleviation will not be truly achieved without rapid agricultural growth. Assisting the rural poor to enhance their livelihoods and food security in a sustainable manner is therefore a great challenge. Broadly put, increases in agricultural productivity are central to growth, income distribution, improved food security and alleviation of poverty in rural Africa (FAO, 2002). The integration of ICT in agriculture therefore can be utilised for providing accurate, timely and relevant information to farmers' thereby facilitating environment for remunerative agriculture (Okeke, Nwalieji and Uzuegbunam, 2015).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 inputs such as fertilisers, seeds and information to enhance their productivity.

Government has been trying to revive the agricultural sector through the introduction of different programmes and initiatives including the Agricultural Transformation Agenda (ATA). Osisioma (2012) summarized the transformation agenda as the process and program directed at addressing government focus on the public service, security, law and order and agricultural reform. Under the Agricultural Transformation Agenda (ATA) programme, different platforms were put in place to facilitate the transformation: they are the Nigerian Incentive-Based Risk Saving System for Agricultural Lending (NIRSAL), marketing co-operations, Growth Enhancement **S**upport Scheme (GESS), staple chops processing zones and marketing co-operative.

The process of communication which involves the dissemination of innovation and social engineering is fundamental to extension training of influencing desired behavior acquisition and change. Communication is widely seen as a two-way process in which the sender (source of information/message) and receiver of information are seen as active participants who are involved in an exchange process

The global revolution in information and telecommunication technology has created an opportunity to remedy the former state of information gap 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. Mao, (2012) opined that information of adequate quality is a necessary condition for improvement of all areas of agriculture.

Growth Enhancement Support Scheme (GESS) as a component of ATA, was designed to enhance agricultural productivity through timely, efficient and effective delivery of yield-increasing farm inputs; is also aimed at subsidizing the costs of major agricultural inputs, such as fertiliser and seedlings for farmers. It provides a unique connecting link as it targets the farmers directly with critically needed modern farm inputs on real-time basis. As part of the GESS scheme, the Federal Ministry of Agriculture led by the Minister, Akinwumi Adesina, equipped millions of farmers in the rural areas with mobile phones to link farmers directly to government. This was expected to opportunity to monitor the progress of farmers, as well as disseminate valuable information to them. The e-wallet, the phone-based component of the project, was to 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.

In their various designs and capabilities, mobile phones can be found in the pockets of the wealthy and poor alike. Even in rural areas, mobiles are growing in number and sophistication (The Economist, 2010). The right use of mobile phone in agriculture and any other aspect of livelihood may be attributed its characteristics, (Donovan, 2012). Mobile phone has found applications in the agricultural sector and this includes, mobile phone application, mobile-phone-based Money Transfer, weather forecast, short message services (SMS), Unstructured Supplementing Service Data (USSD), Interactive Voice Response (IVR), General Packet Radio Services (GPRS), Mobile Wireless Application Protocol (WAP), Multimedia Messaging Service (MMS), Mobile Web, etc. All these services have been used in many ways in improving agricultural production.

Due to the rapid development in the IT industry, different facets of life including health, technology and agriculture are affected. In 2013, the Federal Government introduced the use of mobile phones to farmers in the rural areas as part of the transformation agenda in the agricultural sector. This initiative covered the entire country. The extent to which farmers enjoyed the free mobile phone is relative. However, mobile phones have been acquired by all strata of the society which is expected to contribute to development. It is also expected to present both opportunities and challenges, especially for critical sectors such as agriculture. Personally acquired or government distributed mobile phones are expected to serve the owners and contribute to their livelihood and wellbeing. It could not be categorically stated that farmers in Edo North zone used the phone based services to obtain ARD information. The question on the constraints to usage of MPBSs needs to be answered. Empirical evidence on ownership of mobile phones by farmers, their usage of MPBSs and use of the services for ARD information also becomes relevant.

The main objective of the study is to assess the use of mobile phone based services (MPBSs) for accessing agricultural and rural development (ARD) information in Edo state Nigeria.

Specifically, the study;

1. described the socio-economic characteristics of farmers in Edo State;
2. examined mobile phone based services usage by farmers;
3. ascertained the use of MPBSs to access ARD information ;
4. identified the constraints to the use of mobile phone services in ARD

The study hypothesis, stated in null form, is as follows;

There is no significant relationship between farmers' socio- economic characteristics and use of mobile phone based services to access ARD information.

METHODOLOGY

The study was carried out in Edo State which share boundaries with Delta State on the south, Ondo on the West and Kogi on the North east. Edo state consists of 18 local government areas. The main towns in the state are Benin which is the capital [ancient city of Benin kingdom], Esan, Ora, Estako, Igbanke etc. The major occupation of the people includes farming, handcraft and trading. The major crops grown by the people include yam, maize, cocoa, rubber, oil palm and cassava. Edo North was chosen because it has more rural communities than the other zones in Edo state.

A two stage sampling process involving random sampling technique was used to select three local government areas from eight in Edo North Senatorial District, Owan, Etsako and Akoko-Edo and five (5) communities were selected from each local government area to give 15communities and 10 respondents were selected from each community making a total of 150 respondents in all. Data were collected using structured questionnaire and analysed using descriptive and Spearman rho Correlation.

The respondents' use of mobile phone services was measured using 3point scale; highly used=3, used=2, not used=1.

The respondents level of usage of mobile phone services measured were using 20 items on a 4-point likert scale, 1 = not used, 2 = slightly used, 3= moderately used, 4 = highly used. A mean score of 2.5 and above indicates the use of mobile service. The minimum score=20 and maximum= 40

Information/technology accessed-this was measured on 3-point scale of highly accessed=3, accessed=2, not accessed=3 for 20 items.

RESULTS AND DISCUSSION

Socioeconomic characteristics of respondents

Table 1 shows that majority of the respondents were males (72.7%), within the age group of 51-60 years (53.3%). Married people were 80.0% with 62.0% having family size of 5-8 persons. The mean farm size was 2.33ha, mean farming experience of 15.02years while 34.7% attended secondary school and 94.7% had telephones. The implication is that there were more males than females. Majority of the respondents were within the age group of 51 – 60 years (58.6 %). Family members could serve as sources of information on the use of mobile phone services especially youth and children. Orojobi and Damisa (2007) reported that household size is crucial in agriculture, where the main source of labour is the family in developing countries like Nigeria. Most of the respondents can at least read and write. Farmers with at least primary school education will be able to operate a mobile phone and access some basic services. Majority of the respondents were primarily farmers (57.3%). Ownership of phone of 94.7% of the respondents is an indication that MPBSs have potentials of being used to access ARD information.

Table 1: Socioeconomic characteristics of Respondents n = 150

Variable	Frequency	%	Mean
Age range			
30 & below	9	6.0	
31-40	16	10.7	50.64 years
41-50	45	30.0	
51-60	80	53.3	
Family size range			
1-4	39	26.0	
5-8	93	62.0	6persons
9-12	16	10.7	
>12	2	1.3	
Marital status			
Single	13	8.7	
Married	120	80.0	
Divorced	17	11.3	
Education			
Non formal	12	8.0	
Primary	47	31.3	
Secondary	52	34.7	
Tertiary	39	26.0	
Major occupation			
Farming	86	57.3	
Civil servant/Entrepreneur	32	21.4	
Trading	30	20.0	
Other	2	1.3	
Farm size range			
1 & below	34	22.7	
1.1-1.5	53	35.3	2.33 ha
1.6-2.0	49	32.7	
>2.0	14	9.3	
Farming experience range			
10 – 20	34	22.7	
20 – 30	53	35.3	20.02 years
30 – 40	49	32.7	
40 >	14	9.3	
Mobile phone ownership			
Do not own	8	5.3	
Own	142	94.7	

Respondents' frequency of using mobile services for agricultural and rural development information

Table 2 shows that mobile phone call and short message services were used to access ARD information ($\bar{x}$ =3.39) and ($\bar{x}$ =3.29) respectively. The result agrees with the findings of (Falola and Adewumi, 2012). The implication is that ARD information and technologies were only accessed through phone calls and SMS since other MPBSs were rarely used. It is also an indication that respondents owned phones but underutilised the services/applications they could benefit from. Information might not have been disseminated via MPBSs

Table 2: Respondents' use of mobile phone-based services for agricultural and rural development information

Variables	Mean	SD
Mobile phone application	3.39*	0.94
Short message services (SMS)	3.29*	1.01
Mobile Web	1.99	1.24
Weather forecast	1.97	1.31
Unstructured Supplementary Services Data (USSD)	1.79	1.13
Mobile Wireless Application Protocol (WAP)	1.69	1.12
General Packet Radio System (GPRS)	1.66	1.08
Interactive Voice Response (IVR)	1.65	1.11
Multi Messaging Service (MSM)	1.60	0.93
Mobile phone based money transfer	1.27	0.67

**** Frequently used (mean > 2.00)***

Respondents' access to agricultural and rural development information using mobile phone services

Results in Table 2 shows that the most accessed information using phone based services were on farmers' meetings ($\bar{x}$ =2.26), planting/breeding materials ($\bar{x}$ =2.17), community meetings ($\bar{x}$ =2.56), community security warnings and alarms ($\bar{x}$ =2.47). Others include community projects ($\bar{x}$ =2.52) seedlings/planting ($\bar{x}$ =2.44) and fertiliser application ($\bar{x}$ =2.11). Considering the commonness and high ownership level of mobile phones in the study area, it will be expected that most of the farmers will use them for accessing ARD information. It could also be that most of the information were not available or disseminated through phone services.

Table 3: Respondents' access of technology/information with phone-based services

Information	Mean	SD
Farmers' meetings	2.26*	0.52
Planting/breeding materials	2.17*	0.35
Fertilisers and application	2.11*	0.29
Land preparation	1.83	0.27
Tractor hiring/mechanisation	1.21	0.95
Irrigation/dry season farming	1.07	0.79
Weather forecast	1.99	0.66
Health and nutrition	1.99	0.69
Agro chemicals	2.02*	0.83
Modern tanks	1.67	0.72
Pumping machine	1.62	0.75
Environmental management	1.57	0.65
Livestock rearing	1.54	0.97
Marketing	1.01	0.73
Storage	1.85	0.41
Processing	1.57	0.92
Trainings and workshops	1.74	0.68
Community meetings	2.56*	0.57
Community projects	2.52*	0.49
Community security warnings and alarms	2.47*	0.53

**** Accessed (mean > 2.00)***

Constraints to the usage of mobile phone services in ARD

From the result presented in Table 4, all the constraints were very serious among which include, insufficient capital ($\bar{x}$ = 3.65), erratic electricity supply ($\bar{x}$ = 3.40) and low level of information ($\bar{x}$ = 3.12) among others. The enormity of the constraints could have seriously prevented the farmers from optimizing MPBS for ARD purposes.

Table 4: Constraints to the usage of mobile phone services in agricultural and rural development

Variables	Mean	Standard Deviation
Inadequate Capital to recharge credits	3.65*	.66
Erratic electricity supply	3.40*	.92
Low level of information	3.12*	.93
Bad communication network	2.87*	.89
Complexity of technologies	2.71*	1.03
Unable to apply technology to local condition	2.59*	.99
High cost of technology	2.55*	1.22
Government policies	2.31	1.05

**** Have access (mean > 2.50)***

Relationship between farmers' socio-economic characteristics and use of mobile phone-based ARD services

Table 5 shows the relationship between the farmers' socioeconomic characteristics and the use of mobile phone services using Spearman rho correlation. The table indicates that age (r = -0.401), education (r = 0.413), family size (r = 0.211), farming experience (r = -0.229) and farm size (r = 0.166) were all significant at 5% level of probability. The negative coefficient of age indicates that younger people frequently access mobile phone services among the respondents in the study area, than the older population which could relate to the fact that younger people have more access to mobile phone. Those with higher level of education, larger farm size used mobile services to access ARD information more. However, respondents with less farming experience used mobile phone services more.

Table 5: Relationship between farmers and use of mobile phone for ARD services (Spearman rho Correlations)

Independent variables	Coefficient (rho)	p-level	
Age	-0.401*	0.000	Significant
Education	0.413*	0.000	Significant
Family size	0.211*	0.009	Significant
Faming experience **(years)**	-0.229*	0.005	Significant
Farm size (ha)	0.166*	0.043	Significant
Sex	-0.003	0.972	Not Significant

CONCLUSION AND RECOMMENDATIONS

The study concludes that majority of the respondents owned mobile phone however, only calls and SMSs were the mobile phone services used to access ARD information due to constraints such as inadequate capital to recharge, bad network, poor and erratic electricity supply, poor knowledge of application and low level of ARD information dissemination with telephone.

Based on the findings of this study, the following are recommended;

1. Sensitisation and capacity building for farmers by Edo State Extension service and mobile service providers on the use of mobile phone based-services will be necessary. This will expose farmers to the relevant knowledge to optimally utilise their mobile phone services;
2. Public, private and NGO development institutions should create platforms for ARD information dissemination for easy access by using phone based services;
3. Public, private and community efforts should be harnessed to address the identified constraints especially in the area of improving network reception at the communities and addressing erratic power supply.

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