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ANALYSIS OF UTILIZATION OF MOBILE PHONES IN AGRICULTURAL INFORMATION DISSEMINATION AMONG MAIZE FARMERS IN ONDO STATE, NIGERIA

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ABSTRACT

This study investigated maize farmers' utilization of mobile phones in accessing agricultural information in Ondo State, Nigeria. Multi-stage sampling procedure was used in selecting 100 maize farmers. Data for the study was collected with the aid of structured questionnaire. Data obtained were analysed by descriptive (frequency counts, percentages and mean) and inferential (correlation) statistics. Findings revealed that maize farmers were young with mean age of 43.5 years. Most (69%) of the farmers were male and 89% were married. Maize farmers were mainly found to accessed range of agricultural information by using voice calls (99%), phone radio (89%) and SMS platforms (88%). The level of utilization of internet, WhatsApp, Facebook, emails and multimedia was low. Correlation analysis result revealed significant relationships between farmers' level of education ($r = 0.446$, $p \leq 0.05$), maintenance cost ($r=0.325$, $p \leq 0.05$) and utilization of mobile phones. The basic features of the mobile phones were found as the main sources of disseminating agricultural information to the maize farmers. Thus, the device is currently underutilized. The study recommends adequate training of extension agents and farmers on the use of mobile phone with provision of support infrastructure to promote its usage in disseminating agricultural information.

Keywords: Agricultural information; maize farmers; mobile phones

INTRODUCTION

For developing countries to catch up or leapfrog in agricultural development, access to timely, reliable and relevant agricultural information is an essential factor. Information is currently regarded as a factor of production like other factors such as labour, capital and land (Rao, 2007). In this vein, Dralega (2007) argues that if information is combined with other factors of production, it will enhance agricultural production and marketing. Information is a vital resource for development and empowerment as it provides farmers with the ability to make informed decisions pertaining to production, marketing and management of

agricultural activities. As posited by Aina *et al.* (1995) cited in Ogboma (2010) information has a vital role to play in improving and sustaining agricultural production of any nation. Therefore, providing relevant, reliable, and timely information to farmers will not only help them make accurate decisions, but also contribute to increased productivity (Deribe, 2016). Amidst these needs, the agricultural sector is experiencing issues on climate change, loss of biodiversity, drought, desertification, increase in food prices and inefficient supply chains. For smallholder farmers to rise above these challenges, access to the right information is no more a luxury but a necessity (Sylvester, 2012). Meanwhile, it has been observed that most agricultural innovation and information did not get to the farmers on time due to poor communication linkage. This situation arises as a result of deficits in support infrastructure in rural areas where most of the smallholder farmers reside. The use of conventional extension methods such as farm or home visits and the use of contact farmers do not provide the needed agricultural information on a timely basis either (Deribe, 2011). Most farmers are being exploited by middle men due to lack of easy and timely access to information on current market prices for their produce. Some farmers are lagging behind in improving their level of production because they are not informed. There is a saying that if you are not informed you will be deformed. There is therefore a pressing need to make timely information available to farmers using modern technology that is both simple and cost effective as it offers in mobile phone technology. For instance, Aker and Mbiti (2010) affirmed a situation in which use of mobile phone was able to reduce the search cost for smallholder farmers in Niger Republic by almost 50%. One of the advantages of mobile telephony is that users are not passive recipients but active participants as it offers opportunities for interaction and access to multiple sources of information.

Information Communication Technologies (ICTs) revolution has permeated every aspect of life and farmers are already especially benefitting from mobile communications. ICTs are the best hope to accelerate development process and mobile telephony is one of the most exciting forms of ICTs particularly in the context of the developing countries (Nyamba and Mlozi, 2012). Mobile phones have great potential to transfer information at the speed of light regardless of distance. Mobile phones, being a component of ICTs, are now accessible to 60% of the population in sub-Saharan Africa countries (World Bank, 2016). The fast penetration of mobile phones could be attributed to its ease of use, low cost in comparison to other ICTs such as computers and its potential to break geographic barriers (De Silva and Ratnadiwakara, 2008). It was in the same vein that Aker (2011) described mobile phones as cheap and widely used ICT that has a great potential to solve the problem of cost and lack of access to information.

Nigeria is a country where a sizeable percentage of its population is involved in agriculture and agricultural related activities. Most of these people reside in rural areas noted for inadequate infrastructure like telecommunication, roads, pipe-borne water, electricity, and health facilities among others. The smallholder farmers in rural areas in Nigeria have been disconnected from their urban counterparts until 2001 when Global System for Mobile communication (GSM) was introduced. From this intervention, there is currently high inflow of information to rural dwellers through mobile communication. Mobile telephony is without doubt one of the most explosive developments ever to occur in Nigeria's telecommunications sphere (Fashina and Odefadehan, 2014). To acknowledge the growth of mobile communication, the penetration rate of mobile phone in Nigeria as at 2018 was 84 per cent from 53 per cent in 2016 (The Guardian, 2018). In other words, the adoption of mobile phone is growing fast among Nigerians.

It is then appropriate to ascertain if farmers are really grasping the potentials of mobile phone technologies beyond social communication. For the past two decades, maize has been the fourth most consumed cereal crop in Nigeria, after sorghum, millet and rice (FAOSTAT, 2012). According to Adebowale (2004) cited in Offiah (2015), demand for maize in Nigeria usually exceeds supply as a result of its additional uses as livestock feeds and in baking and brewing industries. The shortfall is often being bridged through importation. It is therefore expected that with adequate agricultural information available to the maize farmers, there will be increase in production towards meeting the growing consumers demand. The specific objectives of the study described the socio-economic characteristics of maize farmers; assessed maintenance cost of using mobile phones; identified the types of agricultural information accessed by maize farmers; described the mobile phone platforms being used in accessing specific agricultural information by maize farmers and ascertained the level of utilization of mobile phone in accessing agricultural information by maize farmers. The study hypothesized relationship between selected socio-economic characteristics of maize farmers and their level of mobile phone utilization in accessing agricultural information.

MATERIALS AND METHODS

Study Area

The study was carried out in Ondo State, Nigeria. Ondo state was created in February 3, 1976 and is one of the 36 states of the federation. The state is bounded to the north by part of Ekiti and Kogi states, to the east by Edo and Delta states, to the south by Atlantic Ocean and to the west by Osun and Ogun states. The state has a land area of 15,820 km² lying between latitudes 5° and 8°N and longitudes 4° and 6°E. The population of the state was 4,671,700 in 2016 (National Bureau of Statistics, 2016). The climate is tropical with two seasons: rainy season which is from April to October and dry season from November to March. The annual temperature ranges between 21°C to 29°C and humidity is relatively high. The annual rainfall varies from 2,000mm in the southern areas to 1,150mm in the northern areas. About 65% of the state labour force derive livelihood from the agricultural sub-sector. The state has luxuriant vegetation with rain forest zone in the south and sub-savannah forest in the northern fringe. The climate supports the growth of cocoa, rubber and oil palm on large scale. Other crops such as maize, yam, rice, soybeans, cassava, cashew, citrus, coffee, kola nut and plantain are produced in large quantities. The state is also blessed with very rich forest resources where some of the most exotic timber in Nigeria abounds.

Sampling Technique

The population of the study constituted all maize farmers in Ondo state. Multi-stage sampling procedure was utilized to select 100 maize farmers in the study area. The first stage involved random selection of Akure South and Akoko North West Local Government areas from the eighteen (18) Local Government Areas in the state. In the second stage, two (2) villages were purposively selected from each of the two (2) Local Government areas due to high involvement in maize farming. In the third stage, a list of five hundred (500) maize farmers was generated from the two (2) Local Government areas. The last stage involved proportionate sampling of 20 percent of the maize farmers from the sample frame. Thus, a total sample size of one hundred (100) maize farmers was used for this study.

Data Collection

Primary data from maize farmers were collected through the administration of structured questionnaire. Data were collected on socio-economic characteristics of the respondents, maintenance cost of using mobile phones, types of agricultural information accessed by the maize farmers, the mobile phone platforms used in accessing agricultural information by the maize farmers, and the level of maize farmers' utilization of mobile phone in accessing agricultural information.

Measurement of Study Variables

The maintenance cost which is the cost of using mobile phones was measured by obtaining the cost elements of the following: cost of recharge cards, cost of charging the phones, cost of buying fuel, and cost of repairs of technical faults. Agricultural information accessed by maize farmers was measured by asking the respondents to indicate through ticking either Yes or No response option against a list of types of information. Therefore, the Yes was coded one (1) and No was coded zero (0). Mobile phone platform used by the maize farmers to access agricultural information was measured by asking the respondents to indicate through ticking either Yes or No response option against the types of mobile phone platform being used by them in accessing specific agricultural information. Therefore, Yes was coded one (1) and No was coded as (0). The level of maize farmers' utilization of mobile phone in accessing agricultural information was measured on a three point Likert-type scale range from often =2, occasionally =1 and never=0. The value 2, 1, 0 were added and divided by 3 to get a mean score of 1.0. Any variable with a mean score of 1.0 and above was regarded as High utilization while any variable less than 1.0 was regarded as Low utilization.

Data Analysis

Data collected were subjected to descriptive statistics in form of frequencies and percentages. Pearson Product Moment Correlation was used to test the study hypothesis.

RESULTS AND DISCUSSION

Socio-economic Characteristics of Respondents

Results in Table 1 show that 69% of the respondents were males while 31% were females. This indicates that maize production in the study area was male dominated. This result is corroborated with the finding of Ibitola *et al.* (2019) that 68.3% of maize farmers in Oyo State were males. Finding on age reveals that 45% of the maize farmers was below 41 years with the mean age of 43.5 years. This finding is similar to that of Oladejo and Adetunji (2012) that found the mean age of maize farmers in Oyo state as 45.8years. It is therefore expected that the inquisitiveness that is associated with youthful years will enhance the utilization of mobile technology among the farmers. Furthermore, majority (89%) of the maize farmers was married, 10% was single and 1% was widowed. That majority was married implies that more hands would be available for maize production activities.

Table 1: Distribution of respondents according to socio-economic characteristics (n=100)

Socio-economic characteristics	Frequency	%	Mean	SD
Sex				
Male	69	69.0		
Female	31	31.0		
Age (years)				
Below 41	45	45.0		
41-50	32	32.0	43.50	8.74
51-60	20	20.0		
Above 60	3	3.0		
Marital status				
Single	10	10.0		
Married	89	89.0		
Widowed/widower	1	1.0		
Educational level				
No formal education	1	1.0		
Adult education	4	4.0		
Primary education	28	28.0		
Secondary education	37	37.0		
OND	12	12.0		
NCE	4	4.0		
HND/B.Sc.	12	12.0		
Postgraduate	2	2.0		
Household size				
1-5	62	62.0	5.00	1.96
6-10	38	38.0		
Farm size (hectares)				
1-5	86	86.0	3.20	3.18
6-10	11	11.0		
Above 10	3	3.0		
Number of functional mobile phones				
1-5	95	95.0	3.00	1.55
6-10	5	5.0		
Years of using mobile phone				
1-5	18	18.0		
6-10	77	77.0	7.70	2.16
Above 10	5	5.0		

Source: Field survey. 2018

Results in Table 1 also show that 28% obtained primary school leaving certificate, 37% completed secondary school, 12% had Ordinary National Diploma (OND), 12% had Higher National Diploma (HND)/Bachelor of Science (B.Sc.) and 1% had no formal education. This supports the work of Ibidapo *et al.,* (2018) that majority (89.5%) of the arable crop farmers in Ondo state, Nigeria had some form of formal education. This indicates that majority of the maize farmers in the study area are adequately prepared to grasp the technicality of handling mobile phones to access agricultural information in maize production. The majority (62%) of the respondents had between 1-5 household size while 38% had between 6-10 household size. The average household size of the respondents was 5 persons per household. This indicates that maize farmers had fairly small household size. Study findings show that majority (86%) of the respondents had a farm size between 1-5 hectares while 11% had 6-10 hectares and 3% had above 10 hectares. The average farm size

of the respondents was 3.2 hectares (Table 1). This corroborates the finding of Owoeye *et al.* (2017) that maize farmers in Ekiti state operates on an average farm size of 3.4 hectares. The findings show that the maize farmers in this study area are small-scale farmers. Because small-scale farmers produce the bulk of food and fibre in the country, they should be given a push through education and training to utilize mobile phones in accessing agricultural information. Furthermore, 95% of the respondents had between 1-5 functional mobile phones in their household while 5% had 6-10 mobile phones. The average number of functional mobile phones possessed in the household was 3. This agrees with the finding of Asa and Uwem (2017) that observed high access to mobile phones utilization by farmers in Itu area, Nigeria. This implies that mobile phones are readily available to farmers in the study area and they can benefit from their multi-functionality through awareness, education and training. In addition, results in Table 1.0 reveal that 77% of the respondents had used mobile phone within the range of 6-10 years while 18% had used mobile phone within 1-5 years and 5% had used mobile phone for over 10 years. The average years of using mobile phone was 7.7 years. The respondents are expected to be fully aware of a range of functions that mobile phones could be used to perform.

Maintenance Cost of Using Mobile Phones

Results in Table 2 indicate that maize farmers spent ₦1,406 to buy recharge card, ₦61.5 to recharge phone battery, ₦196.00 to buy fuel during power outage and ₦13.18 to repair technical faults each week. This shows that for mobile phones to be in good condition for agricultural information, maize farmers spent the highest amount of money on purchase of recharge cards. This supports the findings of Haruna *et al.* (2013) that ranked cost of subscription as the topmost constraints to utilization of mobile phones among farmers in Kaduna State, Nigeria.

Table 2: Distribution of respondents according to the maintenance cost of using mobile phones (n=100)

Maintenance cost/week	Frequency	Percentage	Mean	SD
Buying recharge card (₦)				
Below 1,000	50	50.0		
1,000 – 5,000	47	47.0	1406.0	1277.45
Above 5,000	3	3.0		
Charging mobile phone (₦)				
No cost	83	83.0		
Below 500	15	15.0	61.5	188.14
500 - 1000	1	1.0		
Above 1,000	1	1.0		
Purchase of fuel for generator (₦)				
No cost	40	40.0		
Below 500	50	50.0	196.0	696.15
500 – 1,500	4	4.0		
Above 1,500	6	6.0		
Repairs of technical faults (₦)				
Below 50	95	95.0	13.18	35.06
50 - 100	2	2.0		
Above 100	3	3.0		

Source: Field survey, 2018

Agricultural Information Accessed by Maize Farmers

The results in Table 3 show that the entire respondents (100%) accessed agro-input supply information, 99% of them obtained market price information, 99% obtained information on new variety of maize, 99% on pests and diseases control, 98% on market for products, 98% on advisory services, 97% on workshop/training, 90% on credit facilities, 90% on post harvest practices, 89% on agronomic practices, and 76% on weather reports. Weather report had 76% because some of the respondents said they can predict the weather and know the right time for planting maize. With these arrays of agricultural information at the farmers' disposal, it is anticipated that farmers would be able to make informed production and marketing decisions in maize production. This is supported with the findings of Mittal and Mehar (2012) that information through mobile phones has benefited farmers in India to be better connected to markets and attract better market prices.

Table 3: Distribution of respondents on types of agricultural information accessed (n=100)

Type of agricultural information	f	%
Agro-input supply	100	100.0
Market price	99	99.0
New variety of maize	99	99.0
Pests and diseases control	99	99.0
Market for products	98	98.0
Advisory services	98	98.0
Workshop/training	97	97.0
Credit facilities	90	90.0
Post harvesting practices	90	90.0
Agronomic practices	89	89.0
Weather reports	76	76.0

Source: Field survey, 2018

Mobile Phone Platforms Used by the Maize Farmers to Access Specific Agricultural Information

Table 4 shows that voice calls is the mobile phone platform mainly used by the respondents to access specific agricultural information which were: market price (85%), availability of market for products (84%), new variety of maize (76%), agro-input supply (74%), advisory services (74%), post harvest practices (71%) while weather report (41%) was mainly accessed through phone radio. Furthermore, 21% accessed workshop/training information through SMS. This indicates that voice calls, phone radio and SMS were the main mobile phone platforms utilized by the respondents. The ease of operation of these basic features may be responsible for their wide usage. Other platforms, such as WhatsApp, Facebook, internet and e-mail were rarely utilized by the respondents. This may be as a result of lack of technical know-how for the farmers and the cost of smart phones that possess such features.

Table 4: Distribution of respondents according to the type of mobile phone platforms used to access specific agricultural information (n=100)

Agricultural information	Mobile phone platforms							
	Voice calls %	Phone radio %	SMS %	Internet %	Facebook %	Whatsapp %	Email %	MMS %
Market price	85.0	8.0	7.0	3.0	-	1.0	-	-
Market for products	84.0	14.0	5.0	2.0	1.0	-	-	-
Weather reports	32.0	41.0	1.0	4.0	6.0	1.0	1.0	-
New variety of maize	76.0	17.0	6.0	4.0	1.0	2.0	-	-
Credit facilities	60.0	28.0	10.0	7.0	3.0	1.0	-	-
Pest and diseases control	69.0	26.0	4.0	7.0	5.0	-	-	-
Agro-input supply	74.0	22.0	10.0	4.0	2.0	-	-	-
Advisory services	74.0	21.0	8.0	5.0	2.0	-	-	-
Agronomic practices	63.0	22.0	5.0	4.0	2.0	-	-	-
Post harvest practices	71.0	16.0	3.0	4.0	1.0	-	-	-
Workshop/training	56.0	33.0	21.0	9.0	4.0	-	-	-

Source: Field survey, 2018

Level of Maize Farmers' Utilization of Mobile Phone in Accessing Agricultural Information

Results in Table 5 revealed that the services that were highly utilized by respondents were voice calls ($\bar{x}$=1.99), use of phone radio ($\bar{x}$=1.89), receiving text messages ($\bar{x}$=1.88) and sending of text messages ($\bar{x}$=1.87). The following services had low utilization by the respondents; accessing internet ($\bar{x}$=0.75), accessing facebook ($\bar{x}$=0.59), accessing whatsapp ($\bar{x}$=0.56), receiving emails ($\bar{x}$=0.31), sending emails ($\bar{x}$=0.29), and use of multimedia service ($\bar{x}$=0.12).

Table 5: Level of respondents' utilization of mobile phone in accessing agricultural information (n=100)

Services	Often		Occasionally		Never		Mean	Rank
	F	%	F	%	F	%	$\bar{x}$	
Calling (Voice calls)	99	99.0	1	1.0	-	-	1.99	1st
Use of phone radio	89	89.0	11	11.0	-	-	1.89	2nd
Receiving text messages	88	88.0	12	12.0	-	-	1.88	3rd
Sending text messages	87	87.0	13	13.0	-	-	1.87	4th
Accessing internet	27	27.0	21	21.0	52	52.0	0.75	5th
Accessing Facebook	7	7.0	45	45.0	48	48.0	0.59	6th
Accessing Whatsapp	6	6.0	44	44.0	50	50.0	0.56	7th
Receiving emails	7	7.0	17	17.0	70	70.0	0.31	8th
Sending emails	7	7.0	15	15.0	78	78.0	0.29	9th
Use of multimedia services	-	-	12	12.0	88	88.0	0.12	10th

Source: Field survey, 2018

The low utilization of internet, whatsapp, facebook, emails and multimedia can be attributed to inability of the respondents to operate these platforms, cost of operating these platforms or low awareness and appreciation. These findings align with that of Posthumus *et al.* (2013) who stated that there were many farmers in India who subscribed to ESOKO (free mobile agricultural information service) but did not know how to use the service effectively and non-users did not know how to subscribe or were not aware of it at all.

Relationship between Selected Socio-Economic Characteristics of Maize Farmers and their Level of Mobile Phone Utilization in Accessing Agricultural Information

Pearson Product Moment Correlation analysis results in Table 6 show significant but weak correlation between educational level of the maize farmers (0.446) maintenance cost (0.325) and mobile phone utilization in accessing agricultural information. This means that as the farmers' educational level and maintenance cost increase their level of utilization of mobile phone also increase and vise versa. This finding corroborates Assif *et al.* (2017) that shows that with increase in educational level, farmers will want to have more advance information about cultivation through mobile telephony. On the other hand, as the farmers spend more on maintenance cost, it is expected of them to seek returns on their investment by utilizing the mobile phone for the purpose of sourcing for agricultural information.

Table 6: Relationships between selected farmers' socioeconomic characteristics and level of utilization of mobile phone

Variable	Mean	r-value	p-value	Decision
Level of phone utilization	1.025			
Educational level	3.250	0.446	0.001*	Significant
Number of functional phones	3.030	0.096	0.342	Not significant
Age	43.490	-0.121	0.231	Not significant
Farm size	3.160	0.153	0.129	Not significant
Number of years of using mobile phone	7.650	0.037	0.715	Not significant
Maintenance cost	1676.683	0.325	0.002*	Significant

*Significant at ≤ 0.05

CONCLUSION

The youthful age and the high literacy level among the maize farmers have positioned them to take advantage of mobile phones to access agricultural information. Meanwhile, the utilization of mobile phones in accessing agricultural information among maize farmers is still at rudimentary stage. This is premised on the fact that basic features of mobile phones are currently utilized to disseminate agricultural information to the farmers. The multi-functionality of the mobile phones for agricultural information is therefore assured if the educational level and the maintenance cost of using mobile phones are enhanced.

Based on the findings of the study, the following recommendations were made: Government and extension agencies should employ more educative measures to make farmers aware of the various mobile phone platforms and how to operate them; Extension agents, researchers and others in the agricultural sector should make efforts in disseminating more agricultural information to farmers through mobile phone platforms; Government at

each level should fund training of extension agents and farmers on the use of mobile phone and as well ensure adequate provision of support infrastructure; A pilot agricultural information system with relevant stakeholders involving literate farmers and those with high maintenance cost should be implemented in the study area.

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