



Assessment of Mobile Phone Usage for Agricultural Information Sharing Among Rural Farmers in Agricultural Zone One, Rivers State

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Abstract

This study assessed mobile phone usage for agricultural information sharing among rural farmers in agricultural zone one of Rivers State. One hundred (100) respondents were selected through the use of a two-stage sampling procedure. Data collection was done using a structured questionnaire and analysed with mean, frequency counts, percentages and Binary Logit regression analysis. All (100%) of the respondents owned mobile phones and agreed that they use mobile phones to share agricultural information. The majority of the respondents (84%) considered agricultural information shared through mobile phones to be reliable, while 84% had access to the internet but rarely had a power supply (76%). The major mobile phone-based agriculture information sources used by the respondents were voice calls (100%), phone radio (100%) and text messages (100%) while phone radio (\bar{x} = 3.90) and text messages (\bar{x} = 3.92) were the most frequently used. Information on pest management (\bar{x} = 3.67) and Indigenous knowledge (\bar{x} = 3.00) were the main agricultural information shared through mobile phones. Mobile phones are key to information sharing among rural farmers. Improved power supply by responsible agencies in local communities to support mobile phone use for agricultural information sharing among rural farmers.

Introduction

The cell phone and other forms of information and communication technology have become crucial to the advancement of almost every industry, including agriculture (Sharma, 2019; Anadozie, et al., 2021). Among all modern information and communication technologies (ICTs), mobile phone-based communication has recently expanded at the fastest rate and is now the most utilised communication tool. Statista (2022) reports that 86.29 percent of the world's population now own a mobile phone. In addition to changing the narrative in communication and information dissemination in

many organisations, the increasing use of mobile phones has added innovative features to various industries, including agriculture.

There is a significant information gap between farmers and the most recent agricultural research in many developing nations because of a lack of funding and infrastructure to facilitate timely advisory services (Bonephace et al., 2022; Kumar & Karthikeyan, 2019). This information gap hinders the successful adoption of farm innovations necessary for sustainable agriculture development (Ifeanyi-obi & Corbon, 2023). In this regard, ICT, specifically the mobile phone has demonstrated a huge potential to ease communication by facilitating the seamless flow of information between the numerous players in agriculture (African Development Bank, 2022). The usage of mobile phones has brought numerous chances, knowledge and information about different agricultural concerns, challenges and remedies for agriculture growth and knowledge among farmers.

In earlier times, rural farmers rely on indigenous or local knowledge for improved farming systems. In the contemporary agricultural system, acquisition of only indigenous knowledge and practices is not able to yield the expected improvement in the agricultural sector. Farmers need to be abreast of current innovations in the system. Sustainable increase in productivity in the sector requires timely delivery of agricultural information and innovation to farmers. In the face of increasing climatic changes and the associated emergence of new pests and diseases, there is a need for a system that is more responsive to farmers' information needs (Ifeanyi-obi & Corbon, 2023). Extreme weather events, sudden risks and threats occasioned by climate change require an early warning system that is prompt and fast in its delivery. Mobile phone holds much potential in this regard.

Furthermore, in most rural communities in Nigeria, farmers mainly access agricultural information through extension workers, complemented by other sources like radio, fellow farmers, and other agricultural agencies. Unfortunately, Nigeria is currently experiencing a sharp decline in the number of agricultural extension workers making it nearly impossible for the few existing ones to effectively render advisory services on a timely basis. At 1:7500, Nigeria has the lowest ratio of agricultural extension workers to farmers in all of Africa (TASAI, 2020). This has led to poor agricultural information dissemination among the rural farmers hindering progress in the sector. Only a very small proportion of farmers are visited by the agricultural extension agents in most states leaving other farmers to access information from those visited. Poor logistics provided for agricultural extension agents further limit the coverage of these agents in disseminating innovation to rural farmers. Rural farmers most times depend on fellow farmers (contact farmers) to access farm information.

Leveraging mobile phones could enhance the effectiveness and timeliness of agricultural information sharing among rural farmers. Furthermore, Nasir et al (2019) noted that the major source of agricultural information among farmers is through their fellow farmers. It is therefore important to study technologies (such as mobile phones) that could help support timely information sharing among farmers with the intent of developing outcomes to inform adjustments for better usage. It is against this background that this study was designed to examine mobile phone usage for agricultural information sharing among rural farmers in Zone One agricultural zone of Rivers State.

The broad objective of this study was to assess mobile phone usage for agricultural information sharing among rural farmers in agricultural zone one of Rivers State. The

specific objectives were to; describe the usage of mobile phones and internet access; determine rural farmers' use of mobile phone-based agricultural information sources in sharing agricultural information; determine the frequency of usage of mobile phone-based agricultural information sources in sharing agricultural information among rural farmers; identify the types of agricultural information mostly shared through mobile phones among rural farmers; examine the benefits of mobile phone usage in sharing agricultural information among rural farmers; ascertain the constraints associated with the use of mobile phone among rural farmers and determine the relationship between the rural farmers' socio-economic characteristics and their use of mobile phones for sharing agricultural information in agricultural zone one of Rivers State.

Methodology

This research was conducted in the Agricultural Zone One of Rivers State. Rivers State is located at latitude 4°45' North and longitude 6°50' East. Despite being a significant oil-producing state, rural areas in the state are known to be mostly active in agriculture. Approximately, 39% (760,000 hectares) of the state's entire land mass, primarily in the highland region, is suitable for agriculture. The population of the study consisted of all farmers in Agricultural Zone One, enrolled with the Rivers State Agricultural Development Programme. A two-stage sampling procedure was used to select samples for the investigation. Agricultural Zone one (1) of Rivers State consists of eight Blocks, namely; Khana, Gokana, Oyigbo, Tai, Port Harcourt, Obio/Akpor, Eleme and Ogu/Bolo. The first stage consisted of the random selection of two blocks (Khana and Obio/Akpor) from the eight blocks in the zone. In the second stage, the list of farmers who possess mobile phones (302 farmers from Obio Akpor and 201 from Khana) was derived from the list of all the registered farmers in the two blocks chosen. From the list of farmers who possess cell phones, 20% were randomly picked across the two blocks (60 from Obio/Akpor and 40 from Khana), providing a total of one hundred farmers for the research.

Data were collected via questionnaire administration. The utilisation of mobile phones for sharing agricultural information among rural farmers was captured using a "yes or no" response (dummy variable), 1 for those who utilize mobile phones for sharing agricultural information and 0 if otherwise. For the frequency of utilisation of mobile phone-based agricultural information sources in agricultural information sharing, data were obtained using a four-point Likert-type scale of seldom (1), sometimes (2), often (3) and very often (4). A mean score of 2.5 and above suggests the information source is often utilised. The type of agricultural information shared through cell phones, benefits of utilization of mobile phones to share agricultural information and constraints to the utilization of mobile phones in sharing agricultural information was captured using a four-point Likert-type scale of strongly agree (4), agree (3), disagree (2) and strongly disagree (1). An item statement with a mean score of 2.5 and above denotes agreement with the statement. Analysis of data was done with the use of mean, percentages, frequency and Binary logistic regression analysis. The model definition for the Binary Logit regression analysis is implicitly given as follows:

$$C_{ij} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + u$$

C_{ij} , = Dummy variable= 1 if the rural farmer uses a mobile phone for agricultural information sharing and 0 if otherwise.

- X1 = Marital status (Married = 1, Single = 0)
- X2 = Gender
- X3= Age (years)
- X4= Educational qualification (No formal education = 0, Formal Education = 1)
- X5 = Farming venture (crop farming = 1, livestock = 2, both = 3)
- X6 = Monthly income (Naira)
- X7 = Working experience (Number of years spent working)
- X8 = Major Occupation (Farming = 1, non-farming – 2)
- X9 = Household size (number of persons in the household)
- u = stochastic error term.

Results and Discussion

Use of Mobile Phones and the Internet

Results in Table 1 show that all the farmers (100.0%) use their mobile phones for information sharing. As regards the frequency of usage of mobile phones to share agricultural information, the majority (72.0%) of rural farmers use their mobile phones less than once a week to share agricultural information. Eighty-four percent of farmers surveyed think that agricultural information transmitted via mobile phones is accurate and credible.

The majority (84.0%) of the respondents had access to the Internet. According to the farmers, there is an internet facility in their various rural communities, but the problem lies in having the financial resources to buy data to access the internet. As regards frequency of access to the internet, 65.0% of the respondents rarely had access to the internet, 14.0% sometimes had access and 6.0% often had access to the internet. This shows that though there is an internet facility in the rural community, most rural farmers were not able to purchase data bundles to enable them to access the internet regularly. This finding is in line with that of Hamma and Idrisa (2022), who found that e-extension is crucial to the ongoing delivery of extension services to farmers in societies facing challenges like modern-day Nigerian communities, where face-to-face interactions between extension workers and farmers are becoming more difficult. The author presented the need for e-extension to include exchanging data on agricultural policies, cultural practices, fertiliser availability and application, weed control, pest and disease management, marketing tactics, post-harvest tasks, and management of farm machinery and tools.

Table 1: Use of mobile phones and the internet

Variable	Percentage (%)
Usage of mobile to share agricultural information.	100.0
Perceived reliability of information shared through mobile phones	
Reliable	84.0
Not Reliable	16.0
Access to the internet	84.0
Frequency of access to the internet	
Rarely	65.0
Sometimes	14.0
Often	5.0

Source: Field Survey, 2023

Rural Farmers' Use of Mobile Phone-Based Agricultural Information Sources

Result presented in Table 2 shows that all (100%) the respondents' use voice calls, phone radio, text messages (sending and receiving) as agricultural information sources. Results further show that snapping of farm pictures (54%), accessing internet (46%), Facebook (76%) and WhatsApp (80%) were also mobile phone-based agricultural information sources used by the rural farmers. The findings of this study agree with that of Kumar (2023) which found that most of the rural farmers make use of mobile phone in sharing agriculture-based information which in return enhances their agricultural productivity.

Table 2: Rural farmers use of mobile phone-based agricultural information sources

Items	Percentage (%)
Calling (Voice calls)	100.0
Use of phone radio	100.0
Receiving text messages	100.0
Sending text messages	100.0
Watch agric related video/ films	66.0
Snap farm pictures	54.0
Accessing internet	46.0
Sending emails	15.0
Receiving emails	15.0
Accessing Facebook	76.0
Accessing WhatsApp	80.0

Source: Field Survey, 2023.

Rural Farmers Frequency of Usage of Mobile Phone-Based Agricultural Information Sources in Agricultural Information Sharing

Results presented in Table 3 show that receiving text messages ($\bar{x}= 3.92$), rural radio ($\bar{x}= 3.90$) and voice calls ($\bar{x}= 3.81$) were the frequently used information sources among rural farmers. Results further show that rural farmers also use sending of text messages ($\bar{x}= 3.69$), watching of films and videos ($\bar{x}= 3.30$), accessing internet ($\bar{x}= 2.71$) and accessing Facebook ($\bar{x}= 2.56$) as major mobile phone agricultural information sources.

This study's results are in agreement with those of Abdullahi et al. (2019), who also discovered that SMS and voice calls were the most popular mobile applications among North West Nigerian farmers residing in rural areas. It is not surprising that rural farmers are mainly using mobile phone apps that do not depend on the internet. Research (Erlangga, et al., 2023) showed that many of them are not financially buoyant to buy data bundles to enable the use of internet-based apps.

Table 3: Rural farmers frequency of usage of mobile phone-based agricultural information sources in agricultural information sharing

Items	Mean	Standard deviation
Calling (Voice calls)	3.81**	1.9
Use of phone radio	3.90**	2.2
Receiving text messages	3.92**	2.3
Sending text messages	3.69**	1.8
Watch Agriculture related video/ films	3.30**	1.6
Snap farm pictures	2.64**	1.4
Sending emails	2.05*	0.8
Receiving emails	1.95*	0.5
Accessing Facebook	2.56**	1.3
Accessing WhatsApp	2.54**	1.3
Use of multimedia	1.00*	0.4

Source: Field Survey, 2023 **Often, *Seldom

Types of Agricultural Information Shared Through Mobile Phones

Table 4 shows the types of agricultural information shared through mobile phones. Results show that the rural farmers agreed to share information on pest and disease management (\bar{x} = 3.67), indigenous knowledge (\bar{x} = 3.00), planning farming calendar (\bar{x} = 3.29), water conservation strategies (\bar{x} = 3.31) and market prices and trends (\bar{x} = 2.96). The above findings agree with those of Adegbite and Yusuf (2023) that rural farmers frequently use their phones to check market prices, arrange transportation for their produce, and coordinate with buyers. This highlights the importance of mobile phone usage in enhancing market access and trade. Eze (2022) highlighted the role of mobile phones in sharing specific agricultural information. The author found that farmers and extension workers often communicate through mobile phones to discuss pest and disease management strategies. This information exchange helps in identifying and addressing agricultural challenges promptly, thus minimizing crop losses. The author further stated that market-related information, such as price updates and market opportunities, is frequently shared via mobile phones.

Table 4. Types of agricultural information shared by farmers through mobile phones

Agricultural information	Mean	Standard Deviation
Soil management practices	2.97**	1.9
Crop management practices	2.98**	2.0
Planning farming calendar	3.29**	2.1
Water conservation strategies	3.31**	2.1
Pest and disease management strategies	3.67**	2.3
Weed management strategies	2.63**	1.5
Mixed farming	1.61*	0.5
Information on indigenous practice	3.00**	2.0
Livestock-related information (e.g health, breeding, feeding)	2.72**	1.6
Market prices and trends	2.96**	1.9
Weather forecasts	2.88**	1.7
Government agricultural policies and programs	1.28*	0.3
Financial and credit-related information	1.68*	0.7
Available training opportunities	1.85*	1.3
Information on how to organize and hire farm labour/hands.	2.13*	1.4

Source: Field Survey, 2023. **Agree, *Disagree

Benefits of Mobile Phone Usage in Sharing Agricultural Information

Table 5 shows the benefits of mobile phone usage in sharing agricultural information. Improved access to agricultural knowledge (\bar{x} = 3.68), improved overall knowledge of agriculture (\bar{x} = 3.53), a faster rate of adoption of new technologies (\bar{x} = 3.37), faster and timely information dissemination (\bar{x} = 3.36), increased crop/livestock productivity (\bar{x} = 2.53), better market opportunities, price negotiation (\bar{x} = 2.88), improved decision-making in farming activities (\bar{x} = 2.94) and reduced travel time and cost for seeking information in farming activities (\bar{x} = 3.73) were the major benefits of cell phone use in sharing agricultural information.

Johnson et al, (2019), observed that cell phones have become vital tools for farmers in rural regions, with key advantages including linking them to data on farming, market pricing, and weather predictions. The research highlighted how this connection has led to enhanced agricultural production and economic wealth among rural farming populations and showcased the transforming effect of mobile phones in rural farming communities. Similarly, Gonzalez and Kim (2020) in a study of mobile phones as a tool for development, showed that mobile phones have provided rural women with access to agricultural training, extension services, and market information, enabling them to take a more active role in farming and decision-making processes.

Table 5: Benefits of Mobile Phone Usage in Sharing Agricultural Information

Benefits	Mean	Standard Deviation
Improved access to agricultural knowledge	3.68**	2.0
Improve overall knowledge of agriculture	3.53**	1.9
Better development and management of the farm calendar	1.29*	0.6
Faster rate of adoption of new technologies and practices	3.37**	1.7
Faster and timely information dissemination	3.36**	1.5
Increased crop/livestock productivity	2.53**	0.8
Better market opportunities and price negotiation	2.88**	1.2
Enhanced decision-making in farming activities	2.94**	1.4
Reduced travel time and cost for seeking information	3.73**	2.2

Source: Field Survey, 2023. **Agree, *Disagree

Constraints Associated with Mobile Phone Usage in Sharing Agricultural Information.

Result in Table 6 shows that the major constraint to the utilisation of mobile phones in sharing agricultural information among rural farmers was the high cost of smartphones (\bar{x} = 3.68), limited network coverage in rural areas (\bar{x} = 2.59), high cost of data and airtime (\bar{x} = 2.92), limited digital literacy and technical skills (\bar{x} = 3.49) and epileptic power supply (\bar{x} = 3.76).

This finding is also in consonance with the findings of Rahman et al (2020) who found poor network availability, epileptic power supply, unfamiliarity with phone features and

poor internet connectivity in rural areas as major constraints to rural farmers' utilisation of mobile phones in sharing agricultural information among rural farmers.

Table 6: Constraints associated with mobile phone usage

Constraints	Mean	Standard Deviation
Epileptic power supply	3.76*	2.2
High cost of smartphones	3.68**	2.1
Limited digital literacy and technical skills	3.49**	2.0
High cost of data and airtime	2.92**	1.8
Limited network coverage in rural areas	2.59**	1.6
Age-related constraints	2.15*	1.5
Inappropriate subject content	2.10*	1.4
Language barriers in accessing information	1.42*	1.1
Time constraints	1.40*	0.8
Security and privacy concerns	1.37*	0.6

Source: Field Survey, 2023, **Agree, *Disagree

Relationship between Rural Farmers' Socio-Economic Characteristics and use of Mobile Phones to Share Agricultural information.

A statistically significant model was found, demonstrating that the estimated explanatory variables consistently differentiated between mobile phone-using and non-using rural farmers (Chi-square 71.033, $p < 0.01$) with an R-squared value of 0.740, the given model accounted for 74% of the variance in mobile phone usage after controlling for age, sex, marital status, education level, monthly income, years of farming experience, main occupation, and access to electricity.

The results show that rural farmers' use of mobile phones was favourably impacted by factors such as education level, farm size, gender, farming experience, and availability of energy supply. A positive and statistically significant correlation for educational status suggests that rural farmers with higher levels of education are more inclined to use mobile phones to exchange agricultural information. The presence of a reliable source of energy was also shown to have a positive and statistically significant effect. This suggests that the better the availability of reliable electricity to rural farmers, the higher the likelihood that they would use mobile devices to communicate agricultural data. The size of the farm was also shown to have a positive and statistically significant effect. This is to be expected, given that larger-scale rural farmers are more likely to use cell phones to communicate agricultural information than their smaller-scale counterparts. Gender was also shown to be positive and significant.

The coefficient of age was negative and significant, implying an inverse association. Agricultural data sharing using mobile phones will be increasingly common among younger farmers in rural areas. This is also expected given that young folks are known to use mobile phones more frequently than elderly ones.

This result aligns with that of Bako (2019), that educational status impacts farmers' actions and attitudes towards farming operations, notably in the usage of mobile phones in exchanging agricultural information. Farmers who are better educated appear to

comprehend the significance of technology for communication and are more willing to adopt creative initiatives.

Table 7: Relationship between the rural farmers' socio-economic characteristics and their use of mobile phones to share agricultural information

Variables	Coeff	Std. Error	Z-Stat
Age	-.053	-.041	2.694***
Gender	.808	.712	2.288**
Marital status	-1.047	.962	1.185
Educational Level	.588	.658	3.800***
Farming experience	.000	.044	1.000
Major occupation	-.604	.869	.483
Farm Size	.136	.093	2.155***
Access to electricity supply	.824	.787	3.097***
Constant	24.525	21.118	.376
Omnibus Test Chi Square	71.033		
Prob > Chi-square	0.0001		
Nagelkerke R Square	0.740		

*** $P \leq 0.01$ ** $P \leq 0.05$

Conclusion and Recommendations

Rural farmers utilise mobile phones for agricultural information sharing with non-internet-based applications like SMS, voice calls etc in higher use. Utilisation of mobile phones has the potential to enhance the overall productivity and livelihoods of rural farmers in agricultural zone one of Rivers State as findings showed that these rural farmers utilise mobile phones to access agricultural information of critical areas of need including pest and disease management, water conservation and market price information. However, challenges such as limited network coverage, technological literacy, and affordability of mobile devices need to be addressed to ensure that the benefits of mobile phone usage are maximized.

The government in collaboration with extension agents and NGOs should develop and implement digital literacy training programmes to enhance the technical skills of rural farmers, enabling them to effectively use mobile phones and relevant agricultural applications. There is a cogent need for network providers in Nigeria to consider supporting rural farmers with subsidized data bundles. This will encourage increased utilization of mobile phones for information sharing among rural farmers. Power supply in rural areas should be reviewed and alternative strategies of improvement identified. Local government authorities could play a key role in this regard.

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