

UTILIZATION OF MOBILE PHONES IN MEETING AGRICULTURAL NEEDS OF IRISH POTATO RURAL FARMERS FOR BUMPER HARVEST IN JOS, PLATEAU STATE, NIGERIA

Emmanuel Altine Makeri (CLN).

Department of Library and Information Science
Joseph Sarwuan Tarka University Makurdi.

Ashiver Elizabeth Annune (PhD).

Department of Library and Information Science
Joseph Sarwuan Tarka University Makurdi.

and

Victoria Terwase (PhD).

Department of Library and Information Science
Joseph Sarwuan Tarka University Makurdi.

Abstract

The study investigated the utilization of mobile phones in meeting agricultural information needs of Irish Potato Rural farmers for bumper harvest in Jos, Plateau State, Nigeria. Three specific research questions guided the study and one null hypothesis were formulated and tested at 0.05 level of significance. The study adopted descriptive design and was carried out in Plateau State, Nigeria. The population consists of 6,194 registered Irish potatoes rural farmers in Jos South Local Government Area of Plateau State. The sample size of 376 Irish potato rural farmers was drawn for the study using Taro Yamane formula. The instrument for data collection was a self-developed questionnaire titled "Utilization of Mobile Phones in meeting Agricultural Information Needs of Irish Potato Rural Farmers for Bumper Harvest Questionnaire, (UMPAINIRFBHQ). Data collected were analyzed using Frequency Counts, Percentages, Mean and Standard Deviation to answer research questions while Chi-square goodness of fit was used to test the null hypothesis at 0.05 level of significance. Findings revealed that, Irish potatoes rural farmers in Jos, Plateau State, require agricultural information on best seed selection, fertilizer management, pest and disease control, weather updates, market trends, and modern farming techniques to achieve a bumper harvest. Mobile phones play a crucial role in meeting these needs by facilitating access to agricultural information, expert consultations, market monitoring, and peer networking, significantly enhancing farm productivity. The study concluded that, mobile phones play a vital role in meeting the agricultural information needs of Irish potatoes rural farmers in Jos, Plateau State, significantly contributing to improved farming practices and

bumper harvests. The study therefore recommended among others agricultural extension services should implement regular training programs to educate farmers on mobile phone usage, digital literacy and rural electrification initiatives and alternative power sources such as solar chargers should be promoted to ensure continuous mobile phone usage for accessing agricultural resources.

Keywords: *Utilization, Irish potato, Information needs, mobile phones, Rural farmers, Bumper harvest.*

Introduction

Irish potato (*Solanumtuberosum*) is one of the most important root and tuber crops globally and plays a critical role in ensuring food security, income generation, and rural development, particularly in developing countries. In Nigeria, the crop is predominantly cultivated in Plateau State, which is widely regarded as the leading producer of Irish potatoes due to its favorable agro-ecological conditions. (National Bureau of Statistics (NBS), 2022 says Plateau, characterized by its cool climate, fertile volcanic soils, and relatively reliable rainfall patterns, provides an ideal environment for Irish potato cultivation. As a result, the crop has become a major source of livelihood for rural households in Jos and surrounding areas such as Mangu, Bokkos, and Barkin Ladi; International Potato Center (CIP), 2020). The economic importance of Irish potato in Plateau State cannot be overstated. It serves not only as a staple food crop but also as a major cash crop that contributes significantly to household income and employment. Food and Agriculture Organization (FAO, 2021), root and tuber crops, including Irish potato, are essential for enhancing food availability and reducing poverty in sub-Saharan Africa. In Plateau State, thousands of rural households depend on Irish potato farming for their sustenance, and the crop plays a vital role in local and regional

markets. The production and marketing of Irish potatoes also generate employment opportunities along the value chain, including activities such as planting, harvesting, transportation, storage, and trading (NBS, 2022).

In recent years, Irish potato production in Plateau State has witnessed notable improvements, with reports of bumper harvests in several parts of the Jos Plateau. Around 2025, farmers in areas such as Mangu, Bokkos, and Jos recorded significant increases in yield, characterized by larger tuber sizes and higher production volumes. These bumper harvests have been attributed to a combination of favorable weather conditions, increased adoption of improved seed varieties, and expansion in cultivated land (FAO, 2021; World Bank, 2020). Favorable rainfall patterns and moderate temperatures contributed to optimal growing conditions, enabling farmers to achieve higher productivity levels. However, while bumper harvests are generally perceived as positive outcomes, they have also exposed farmers to a number of challenges. One of the major issues associated with increased production is market glut, which occurs when supply exceeds demand. During periods of surplus production, Irish potato prices tend to fall drastically, leading to significant income losses for farmers. This situation is further exacerbated by the lack of adequate storage and processing facilities, which results in high post-harvest losses. According to CIP (2020), a substantial proportion of harvested potatoes in developing countries are lost due to poor storage conditions and inadequate preservation technologies. In addition to market-related challenges, Irish potato farmers in Plateau State also face threats from pest and disease outbreaks, particularly late blight, which is known to significantly reduce yield and quality. Climate variability, including irregular rainfall patterns and temperature fluctuations, further

complicates production and increases uncertainty for farmers. Moreover, insecurity in some farming communities has disrupted agricultural activities, limiting farmers' access to their farmlands and reducing overall productivity (FAO, 2021; World Bank, 2020).

Given these challenges, sustaining bumper harvests requires more than just favorable environmental conditions; it necessitates access to timely, accurate, and relevant agricultural information. Agricultural information plays a crucial role in guiding farmers' decisions regarding crop selection, planting time, fertilizer application, pest and disease management, and marketing strategies. Access to such information enables farmers to adopt improved agricultural practices, respond effectively to emerging challenges, and optimize their production processes. The World Bank (2020) emphasizes that access to information is a key driver of agricultural productivity and rural development, as it enhances farmers' capacity to make informed decisions and reduce risks. For instance, information on improved seed varieties can help farmers select high-yield and disease-resistant crops, while timely updates on pest and disease outbreaks can enable early intervention and minimize crop losses. Similarly, access to weather forecasts allows farmers to plan their planting and harvesting activities more effectively, thereby reducing the impact of adverse climatic conditions. Market information, including price trends and demand patterns, helps farmers make better decisions regarding when and where to sell their produce, thereby maximizing their income (Aker & Mbiti, 2010).

Traditionally, agricultural extension services have been the primary means of disseminating agricultural information to farmers. Extension agents are expected to provide farmers with technical knowledge, training, and advisory services aimed at

improving agricultural productivity (Aker, 2011). However, in many rural areas of Plateau State, extension services are constrained by several factors, including inadequate staffing, limited funding, poor infrastructure, and difficult terrain. In recent times, security challenges have further restricted the movement of extension agents, making it difficult for them to reach farmers in remote communities. As a result, a large number of farmers remain underserved and lack access to timely and reliable agricultural information (FAO, 2021).

In response to the limitations of traditional extension systems, there has been increasing interest in the use of information and communication technologies (ICTs) to support agricultural development. Among these technologies, mobile phones have emerged as one of the most accessible and widely used tools in rural areas. The rapid expansion of mobile telephony in Nigeria has led to a significant increase in mobile phone penetration, even among rural populations. Mobile phones provide a platform for delivering agricultural information in a timely, cost-effective, and scalable manner (GSMA, 2019). Through mobile phones, farmers can access a wide range of information services, including voice calls; short message services (SMS), mobile applications, and internet-based platforms. Social media applications such as WhatsApp have also become popular channels for information sharing among farmers, extension agents, and agricultural stakeholders. (Aker & Mbiti, 2010). These platforms enable farmers to exchange knowledge, share experiences, and receive real-time updates on agricultural practices, weather conditions, and market opportunities.

Empirical studies have demonstrated that the use of mobile phones can significantly improve farmers' access to information, reduce transaction costs, and

enhance agricultural productivity. For example, Aker and Mbiti (2010) found that mobile phone usage in Africa has contributed to improved market efficiency by reducing information asymmetry between buyers and sellers. Similarly, Aker (2011) noted that mobile phones can complement traditional extension services by providing farmers with timely and relevant information, thereby improving their decision-making capacity.

Despite these potential benefits, the utilization of mobile phones for agricultural purposes among rural farmers remains sub-optimal. While many farmers own mobile phones, they often use them primarily for basic communication rather than for accessing agricultural information. World Bank (2020) identified barriers Factors, such as low levels of digital literacy, high cost of airtime and data, poor network connectivity, and lack of awareness of available agricultural information services limit effective utilization. Additionally, language barriers and the absence of locally relevant content further constrain the use of mobile phones as tools for agricultural development. This situation suggests that the mere availability of mobile phones does not automatically translate into effective utilization for agricultural purposes. There is a need to understand how farmers use mobile phones, the types of information they access, and the extent to which such usage contributes to agricultural productivity and bumper harvests. Furthermore, identifying the challenges faced by farmers in using mobile phones and developing strategies to address these challenges are essential for maximizing the potential of mobile technology in agriculture.

It is against this backdrop that this study examines the utilization of mobile phones in meeting the agricultural information needs of Irish potato rural farmers in

Jos, Plateau State. The study seeks to explore how mobile phones are used to access agricultural information needs, the extent to which such utilization contributes to achieving and sustaining bumper harvests, and the challenges that hinder effective use. By addressing these issues, the study aims to contribute to the growing body of knowledge on digital agriculture and provide insights for improving agricultural productivity and rural livelihoods in Plateau State.

Research Questions

The study addresses the following research questions:

- 1 What are the agricultural information needs required by Irish potatoes rural farmers in Jos, Plateau state?
- 2 How do Irish potatoes rural farmers utilize mobile phones in accessing agricultural information for bumper harvest in Jos, Plateau State?
- 3 To what extent does mobile phones utilization contribute to bumper harvest among Irish potatoes rural farmers in Jos, Plateau State?

Hypothesis

One null hypothesis was formulated and tested at 0.05 level of significance:

H₀ Mobile phones utilization does not significantly contribute to bumper harvest among Irish potatoes rural farmers in Jos, Plateau State

Literature Review

Several empirical studies have examined mobile phone technology, agricultural information access, and productivity among rural farmers. Mudege, Nyekanyeka, and Kapalasa (2016) conducted a study in Northern Malawi on Irish potato production

among rural farmers. The findings showed that farmers relied mostly on fellow farmers, local markets, and extension agents for agricultural information. Oladeji, Oyesola, Ogunleye & Raji (2011) observed that, Irish potato farmers needed information on improved crop varieties, fertilizer application, pest/disease control, and market prices. Farmers mainly depended on extension agents, fellow farmers, and radio programs for agricultural information. The reviews also showed that many farmers have access to mobile phones and utilize them for various agricultural purposes such as communication with fellow farmers, accessing market information, and obtaining agricultural advice. Studies by Aker (2011), Eche and Odiaka (2021), and Ifeanyi-obi and Iferobia (2024) revealed that mobile phones play a significant role in improving farmers' access to agricultural information and enhancing farming activities. Similarly, Onu & Okwu (2018) agrees that, farmers who accessed market information had significantly higher productivity and incomes.

By and large, the literature indicates that access to agricultural information is essential for improving farming practices and enhancing agricultural productivity. Agricultural information enables farmers to adopt improved farming techniques, manage pests and diseases, access market information, and make informed decisions regarding agricultural production (Aker, 2011). Although several studies have examined the role of mobile phones and information technologies in agriculture, many of these studies focused mainly on general agricultural production or farmers in different regions. Limited studies have specifically examined the utilization of mobile phones by rural farmers in accessing agricultural information related to Irish potato farming.

Methodology

The study adopted descriptive survey research design and was carried out in Plateau State, Nigeria. The population consists of 6,194 registered Irish potatoes rural farmers in Jos South Local Government Area of Plateau State. The sample size of 376 Irish potato rural farmers was drawn for the study using Taro Yamane formula. The instrument for data collection was a self-developed questionnaire titled "Utilization of Mobile Phones in meeting Agricultural Information Needs of Irish Potato Rural Farmers for Bumper Harvest Questionnaire, (UMPAINIRFBHQ). Data collected were analyzed using Frequency Counts, Percentages, Mean and Standard Deviation to answer research questions while Chi-square goodness of fit was used to test the null hypothesis at 0.05 level of significance.

Results and Discussion

The results of the study are presented according to research questions answered below:

Research Question 1: What are the agricultural information needs of Irish potatoes rural farmers in Jos, Plateau state?

Table 1: Frequency Counts and Percentages of the Agricultural Information Needs of Irish Potatoes Rural Farmers in Jos, Plateau State

S/N	Information Needs	N	Freq	(%)	Freq	(%)	Decision
			Yes		NO		
1	Best seed	349	349	100.0	0	0.0	Needed
2	Fertilizer management	349	349	100.0	0	0.0	Needed

3	Diseases and pest management	300	86.0	49	14.0	Needed	
	349						
4	Weather information	349	334	95.7	15	4.3	Needed
5	Marketing information	349	330	94.6	19	5.4	Needed
6	Weeding and thinning	349	199	57.0	150	43.0	Needed
7	Modern cultivation system	300	86.0	49	14.0	Needed	
	349						
8	Irrigation	349	334	95.7	15	4.3	Needed
9	Planting materials	349	271	77.7	78	22.3	Needed
10	Suitable land	349	331	94.8	18	5.2	Needed
11	Others (Specify)	-	-	-	-	-	

Key; = N-Sample

The finding of the study revealed that the agricultural information needs of Irish potatoes rural farmers in Jos, Plateau State are: best seed, fertilizer management, disease and pest management, weather information, marketing information, weeding and thinning, modern cultivation system, irrigation, planting materials and suitable land. The identified agricultural information needs of Irish potato farmers in Jos align significantly with several previous studies. Salau, Darason and Girei (2020) found similar information needs among potato farmers in the Northern Agricultural Zone of Plateau State, particularly regarding pest and disease management, clean and certified seeds, and fertilizer requirements. Their study specifically highlighted how these information needs were critical for adoption of recommended potato production technologies. Similarly, Bachhav (2012) discovered that farmers required comprehensive information relating to their agricultural activities, including seed availability, weather forecasts, and fertilizer application. The consistency in these

findings suggests that Irish potato farmers' information needs remain relatively stable across different time periods and regions, pointing to the fundamental nature of these requirements for successful potato cultivation. This agreement in findings can be attributed to the specialized nature of potato farming and the consistent challenges faced in its cultivation.

The comprehensiveness of the information needs identified in the current study, ranging from best seed selection to suitable land requirements, also finds support in Roja's (2018) research, which emphasized farmers' needs for information about seed availability and market-oriented agricultural production. However, Tafida and Sa'adu's (2015) study, while confirming these needs, placed greater emphasis on extension services and education as critical factors, particularly for male farmers. This slight variation in emphasis might be explained by evolving farming practices, changing environmental conditions, and the increasing complexity of modern agricultural systems that require more diverse information sources and types.

Research Question 2: How do Irish potatoes rural farmers use mobile phones in accessing agricultural information for bumper harvest in Jos, Plateau State?

Table 2: Frequency Counts and Percentages of how Irish Potatoes Rural Farmers Use Mobile Phones in Accessing Agricultural Information for Bumper Harvest in Jos, Plateau State

S/N	Items Statement	N	F	(%)	F	(%)	Decision
			Yes	No	Yes	No	
1	To access agricultural information related to Irish potatoes	349	349	100.0	0	0.0	Yes
2	To check weather forecasts for	349	320	91.7	29	8.3	Yes

	farming activities							
3	To receive advice on pest and disease management for Irish potatoes	349	340	97.4	09	2.6	Yes	
4	To compare market prices for Irish potatoes?	349	324	92.8	25	7.2	Yes	
5	To access information on improved farming techniques for Irish potatoes	349	340	97.4	09	2.6	Yes	
6	To communicate with agricultural extension services or experts	349	302	86.5	47	13.5	Yes	
7	To know about the modern cultivation system	349	315	90.3	34	9.7	Yes	
8	To know about best irrigation practices	349	330	94.6	49	5.4	Yes	
9	To connect with other farmers to share success stories	349	310	88.8	39	12.2	Yes	
10	To make enquiries about more suitable lands	349	331	94.8	18	5.2	Yes	
11	Others (Specify)	-	-	-	-	-	-	

Key; N- Sample, F- Frequency

The second finding of the study revealed that Irish potatoes rural farmers in Jos, Plateau State, extensively use mobile phones to access agricultural information, enhance farming techniques, communicate with experts, monitor market trends, connect with peers, and improve overall productivity, highlighting the crucial role of mobile technology in modern agriculture. The extensive use of mobile phones by Irish potato farmers in Jos corresponds strongly with Nyamba's (2011) findings, which revealed that

mobile phones offered attractive solutions to farmers' informational needs and helped reduce market information asymmetry. Their study specifically showed how mobile phones provided fast and easy modes of communication, increasing farmers' ability to access agricultural information and secure better markets and prices. Benjamin and Purdue (2016) further support this finding through their research in Malawi, where farmers showed strong awareness and utilization of mobile agricultural information services (MAIS) through both IVR and SMS services.

However, this finding presents some contrast with Chhachhar's (2018) study, which found that many farmers did not use mobile phones for agricultural purposes or market information searching. This disagreement might be attributed to differences in technological adoption rates, varying levels of institutional support for mobile-based agricultural services, and different cultural contexts between the regions studied. The positive findings in Jos might be explained by better mobile infrastructure, more organized agricultural support systems, and possibly higher digital literacy levels among the farmers studied.

Research Question 3: To what extent does mobile phones utilization contribute to bumper harvest among Irish potatoes rural farmers in Jos, Plateau State?

Table 3: Mean and Standard Deviation of the extent to which mobile phones utilization contributes to bumper harvest among Irish potatoes rural farmers in Jos, Plateau State

S/No	Items Statement	N	Mean	SD	Decision
1	Aid in coordinating with other farmers for shared resources	349	2.97	0.93	HE
2	Facilitate remote consultation with agricultural experts	349	2.96	0.81	HE
3	Facilitate ordering of seeds and	349	2.96	0.81	HE

	fertilizers					
4	Assist in tracking farm productivity	349	2.90	0.80	HE	
5	Enhance access to information on pest control methods	349	2.84	0.91	HE	
6	Improve access to weather forecasts for better planting decisions	349	2.74	1.01	HE	
7	Improve learning about new farming techniques	349	2.87	0.84	HE	
8	Provide alerts about potential crop diseases	349	2.88	0.79	HE	
9	Help in planning irrigation schedules more effectively	349	2.70	0.83	HE	
10	Aid in coordinating harvesting and transportation	349	2.77	0.91		
Cluster Mean			2.86	0.86	High Extent	
Key- N-Sample, SD- Standard Deviation, HE - High Extent						

The third finding of the study revealed that Mobile phones utilization significantly contributes to bumper harvest among Irish potatoes rural farmers in Jos, Plateau State. The significant contribution of mobile phones to bumper harvest aligns with several previous studies. Nyamba's (2011) research demonstrated how mobile phone technology adoption had a predictable positive economic impact on rural farming communities. This is further supported by Obong, Mugonola, and Phillips (2018), who found that mobile phone users tended to have bigger fields and better agricultural outcomes, though their study focused on sweet potato rather than Irish potato farming.

The correlation between mobile phone utilization and improved harvest finds additional support in Bachhav's (2012) study, which showed that 80% of farmers used mobile phones for agricultural activities, receiving crucial information about weather forecasts, fertilizer application, and market prices through SMS. However, it's worth noting that Chhachhar's (2018) study presented contrasting results, suggesting that the

relationship between mobile phone use and agricultural success might be influenced by factors such as farmers' education levels, age, and ability to effectively utilize mobile technology for agricultural purposes.

Hypothesis: Mobile phones utilization does not significantly contribute to bumper harvest among Irish potatoes rural farmers in Jos, Plateau State

Table 4: Chi-Square Goodness of fit test of significance of the contribution of Mobile phones utilization to bumper harvest among Irish potatoes rural farmers in Jos, Plateau State

Response Options	Observed N	Expected N	Df	χ^2_{cal}	Sig	α – level	Remark
VHE	83	87.25					
HE	151	87.25					
LE	77	87.25					
VLE	38	87.25					
Total	349		3	72.503	.000	.05	Significant

Df = Degree of Freedom; χ^2_{cal} = Chi-Square Calculated Value; Sig = P-Value, $P < 0.05$

Table 4 shows the Chi-square calculated value of 72.503, degree of freedom (df) =3 and a sig (P-value=0.00) which is less than the alpha value (α) of 0.05. Since $P < 0.05$, the result is significant, therefore the null hypothesis is rejected. This implies that, mobile

phones utilization significantly contributes to bumper harvest among Irish potatoes rural farmers in Jos, Plateau State.

Recommendations

Based on the findings from the study, the following recommendations were made:

1. Government and relevant agencies should strengthen extension services by: Increasing the number of extension agents, equipping them with mobile communication tools. This will ensure timely delivery of agricultural information to Irish potato farmers.
2. Agricultural institutions and development organizations should promote the use of mobile phones by: Developing farmer-friendly mobile platforms, Sending regular updates on weather, pests, and market prices. This will improve farmers' access to relevant and timely information.
3. Regular training programmers' should be organized for farmers to enhance their ability to use mobile phones effectively for agricultural purposes. This should include: Basic phone operations, Accessing agricultural information services.
4. Telecommunication companies, in collaboration with the government, should improve network coverage in rural areas to enhance effective communication and information access.

Conclusion

Based on the findings of this study, it can be concluded that mobile phones play a vital role in meeting the agricultural information needs of Irish potatoes rural farmers

in Jos, Plateau State, significantly contributing to improved farming practices and bumper harvests. Farmers rely on mobile technology for accessing critical agricultural information, monitoring weather conditions, managing pests and diseases, and connecting with experts and peers. However, challenges such as poor network connectivity, limited internet access, power supply issues, and digital illiteracy hinder their ability to fully utilize mobile phones for agricultural purposes. Addressing these barriers is essential for maximizing the benefits of mobile technology in enhancing agricultural productivity and sustainability in the region.

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