International Journal of Advances in Engineering and Management (IJAEM)
Volume 7, Issue 02 Feb. 2025, pp: 647-655 www.ijaem.net ISSN: 2395-5252

Evaluation of Telecommunications Services in Enhancing Agricultural Market Access and Sales in Edo State

Engr. Emmanuel Omosigho[1], Ali Aminu Muhammed[2] and Prince Owochio[3]

[1,2]*Department of Electrical/Electronic Engineering Technology,*[3]*Department of Library, National Institute of Construction Technology and Management, Uromi, Edo State.*

Date of Submission: 15-02-2025 Date of Acceptance: 25-02-2025

ABSTRACT
This study evaluates the role of telecommunications services in enhancing agricultural market access and sales in Edo State, Nigeria. Despite the growing reliance on digital technology, farmers face challenges such as limited market information, inefficient buyer-seller connections, and post-harvest losses, which hinder profitability. The study aims to assess how mobile communication, internet services, and digital platforms impact agricultural transactions and economic outcomes.A survey research design was adopted, targeting farmers in Benin City, Uromi, and Auchi Metropolis. Using a multi-stage sampling technique, 154 farmers were selected, with 146 valid responses analyzed. Descriptive statistics summarized telecommunications usage patterns, while chi-square tests examined relationships between telecommunications and agricultural outcomes. Logistic regression assessed the impact of telecommunications services on sales and profitability, and a t-test compared sales performance between frequent and infrequent telecom users.Results showed that 81.5% of farmers accessed new markets through telecommunications, while 80.8% experienced increased sales and profitability. Frequent telecom users had significantly better economic outcomes ($p < 0.05$). However, challenges such as poor network coverage (53.4%), high data costs (45.9%), and limited digital skills (28.1%) were identified.The study recommends expanding network coverage, lowering data costs, and implementing digital literacy programs to enhance farmers' access to market opportunities. Addressing these barriers can improve agricultural productivity and support Nigeria's economic sustainability.

Keywords: Telecommunications, Agricultural Market Access, Sales Performance, Digital Technology

I. INTRODUCTION

Agriculture remains a cornerstone of the Nigerian economy, particularly in states like Edo, where it plays a crucial role in employment and livelihood. The sector's performance, however, is often hampered by various challenges including market access, inefficient sales channels, and inadequate information dissemination. The integration of telecommunications services into agriculture presents a promising avenue for addressing these issues, potentially transforming market access and sales processes for farmers.

Edo State, located in southern Nigeria, has a diverse agricultural landscape that includes crops like maize, cassava, yams, and vegetables, as well as livestock. Despite its rich agricultural potential, farmers in Edo State face numerous obstacles that impact their productivity and market access. Traditional methods of marketing and sales are often inefficient and characterized by long supply chains, limited reach, and high transaction costs [1]. Farmers frequently encounter difficulties in finding buyers and establishing fair prices, which leads to post-harvest losses and reduced income. The inefficiencies in agricultural market access are exacerbated by infrastructural deficiencies and inadequate information systems. According to the Food and Agriculture Organization [2], inadequate road networks, poor storage facilities, and limited market infrastructure contribute to the challenges faced by farmers in accessing markets and selling their produce effectively.

Telecommunications technology has

International Journal of Advances in Engineering and Management (IJAEM)
Volume 7, Issue 02 Feb. 2025, pp: 647-655 www.ijaem.net ISSN: 2395-5252

emerged as a transformative force in various sectors, including agriculture. Mobile phones and internet services offer significant opportunities to enhance agricultural practices, improve market access, and streamline sales processes. The potential benefits include real-time market information, better communication between farmers and buyers, and more efficient transaction processes [3]. Mobile technology, in particular, has shown promise in addressing some of the critical challenges faced by farmers. Mobile applications and platforms can provide farmers with access to market prices, weather forecasts, and agricultural advice, which are crucial for making informed decisions [4]. Furthermore, digital platforms can facilitate direct transactions between farmers and buyers, reducing intermediaries and increasing profitability. Research by [5] highlights that mobile technology can help bridge the information gap between farmers and markets, leading to better decision-making and enhanced market access. Studies have shown that farmers who use mobile technology for market information and transaction purposes experience increased sales and reduced post-harvest losses [6].

Edo State has witnessed significant advancements in telecommunications infrastructure in recent years. The expansion of mobile networks and internet services has increased connectivity, providing a foundation for leveraging these technologies in agriculture. However, the extent to which these services are utilized by farmers and their effectiveness in improving market access and sales is not well-documented. A report by [7] indicates that while mobile network coverage has improved, there are still gaps in service quality and reach, particularly in rural areas. This uneven distribution of telecommunications infrastructure can affect the ability of farmers in different regions to benefit from digital solutions.

Digital solutions have the potential to revolutionize agricultural market access by enabling more efficient and transparent transactions. Platforms such as e-commerce sites and mobile applications can facilitate direct connections between farmers and buyers, thereby reducing the reliance on intermediaries and lowering transaction costs [8]. These platforms can also offer valuable data analytics and insights that can help farmers make better decisions and optimize their production and marketing strategies. The integration of digital solutions in agriculture can also contribute to improved financial inclusion for farmers. Mobile banking and payment services enable farmers to receive payments quickly and securely, reducing the risk of theft and fraud [9]. Additionally, digital tools can enhance access to financial services, such as microloans and insurance, which are essential for supporting agricultural activities. Despite the potential benefits, there are challenges to the widespread adoption of digital solutions in agriculture. These include limited digital literacy among farmers, inadequate infrastructure, and the cost of technology. Research by [10] indicates that while digital solutions offer significant advantages, their impact is often constrained by barriers related to access and usability.

There is a need for comprehensive research to evaluate how telecommunications services are currently being utilized by farmers in Edo State and to assess their effectiveness in improving market access and sales. Existing studies have explored various aspects of telecommunications and agriculture, but there is a lack of localized research focusing specifically on Edo State. Understanding the specific needs and challenges faced by farmers in this region will provide valuable insights for designing targeted interventions and policies. This research aims to fill this gap by evaluating the role of telecommunications in enhancing agricultural market access and sales in Edo State. By assessing the current usage of telecommunications services and their impact on farmers' market experiences, the study will provide evidence-based recommendations for improving the effectiveness of these services.

II. RESEARCH METHODOLOGY

A. Study Area

The study was conducted in Edo State, Nigeria, a region known for its diverse agricultural activities and heavy reliance on farming for economic sustenance. Edo State is located in the South-South geopolitical zone and has a tropical climate suitable for cultivating crops such as cassava, rice, maize, yam, and rubber, alongside livestock farming. The research focused on three key agricultural hubs—Benin City Metropolis, Uromi Metropolis, and Auchi Metropolis—which represented diverse agro-ecological zones. These locations were selected to provide a comprehensive assessment of how telecommunications services influenced agricultural market access and sales across different farming communities.

B. Method of Data Collection

The study employed a survey research design, utilizing structured questionnaires to gather

International Journal of Advances in Engineering and Management (IJAEM)
Volume 7, Issue 02 Feb. 2025, pp: 647-655 www.ijaem.net ISSN: 2395-5252

primary data from farmers across Edo State. The questionnaire was designed to capture demographic information, the extent of telecommunications usage, its impact on market access and sales, as well as the challenges faced by farmers. A multi-stage sampling technique was adopted to ensure broad representation, selecting respondents from Benin City Metropolis, Uromi Metropolis, and Auchi Metropolis**.**

Data collection was conducted through face-to-face interviews and self-administered questionnaires, ensuring inclusivity of both literate and less literate farmers. Trained research assistants facilitated the process, clarifying any ambiguities in the questionnaire. The study targeted both users and non-users of telecommunications services to allow for comparative analysis. To enhance reliability and validity, a pilot study was conducted before full-scale data collection. The responses were carefully recorded and cross-verified to minimize errors. Secondary data from reports and journals complemented the primary data, providing additional context for analysis.

C. Sample Size and Sampling Technique

The study adopted a multi-stage sampling technique to ensure a representative selection of farmers across the three key agricultural hubs in Edo State: Benin City Metropolis, Uromi Metropolis, and Auchi Metropolis. The total population of farmers considered for this study was 250.

To determine the appropriate sample size, [11]'s formula for sample size determination was applied:

$$n = \frac{N}{1 + N(e^2)}$$

where:

- n = sample size
- N = population size (250)
- e = margin of error (5% or 0.05)

Applying the formula:

$$n = \frac{250}{1 + 250(0.05^2)}$$

$$n = \frac{250}{1.625} \approx 154$$

Thus, a sample size of 154 respondents was selected. Proportional stratified random sampling was used to ensure fair representation from the three study locations, followed by systematic random sampling to select individual respondents.

Out of the 154 questionnaires administered, 146 were returned and deemed valid for analysis, representing a 94.8% response rate. The high response rate was achieved through follow-ups and direct engagement with respondents.

D. Data Analysis

The collected data were analyzed using a combination of quantitative and qualitative methods to ensure a comprehensive evaluation of telecommunications services in enhancing agricultural market access and sales in Edo State.

Descriptive statistics, including frequencies, percentages, and means, were used to summarize demographic characteristics, telecommunications usage patterns, and the perceived impact of telecommunications on market access and sales. These statistical summaries were presented in tables for clarity.

To examine relationships between categorical variables, chi-square tests were conducted to determine whether telecommunications service usage significantly influenced key agricultural outcomes such as market access efficiency, sales performance, and profitability.

A logistic regression analysis was performed to assess the predictive strength of telecommunications services (mobile calls, SMS, internet services, and agricultural information platforms) on sales performance and profitability. This helped to determine which telecommunications services had the most significant impact on agricultural transactions.

An independent samples t-test was used to compare differences in sales and profitability between frequent telecommunications users (daily/weekly) and infrequent users (monthly). This test helped assess whether the frequency of telecommunications usage had a measurable effect on agricultural business outcomes.

The analyses were conducted using SPSS and Microsoft Excel, ensuring accuracy and validity in data interpretation.

III. RESULTS AND DISCUSSION

Results

The study had 146 respondents, with 131 males (90%) and 15 females (10%), indicating a male-dominated agricultural sector (Table 1). The age distribution (Table 2) revealed that the majority of farmers were between 31–50 years (64.4%), suggesting that middle-aged individuals dominate farming activities. Educational attainment (Table 3) showed that 65.1% had tertiary education, while

International Journal of Advances in Engineering and Management (IJAEM)
Volume 7, Issue 02 Feb. 2025, pp: 647-655 www.ijaem.net ISSN: 2395-5252

22.6% had secondary education, indicating a relatively high literacy level among farmers.

In terms of geographic distribution (Table 4), respondents were from Uromi Metropolis (43.8%), Auchi Metropolis (32.9%), and Benin City Metropolis (23.3%), reflecting an emphasis on agricultural hubs in Edo State.

Table1:GenderofRespondents

Sex	Frequency	Percentage	CumulativePercentage
Male	131	90	90
Female	15	10	100
Total	**146**	**100**	

Source:FieldData,2025.

Table2:AgeoftheRespondents

AgeGroup (Yrs)	Frequency	Percentage	CumulativePercentage
Below 20	4	2.7	2.7
20–30	23	15.8	18.5
31–40	46	31.5	50
41 – 50	48	32.9	82.9
Above 50	25	17.1	100
Total	**146**	**100**	

Source:FieldData,2025.

Table3:Respondents' Highest Level ofEducation

LevelofEducation	Frequency	Percentage	CumulativePercentage
No formal Education	Nil	0	0
Primary	18	12.3	12.3
Secondary	33	22.6	34.9
Tertiary	95	65.1	100
Total	**146**	**100**	

Source:FieldData,2025.

Table4:AreaofResidenceinEdo State

AreaofResidence	Frequency	Percentage	CumulativePercentage
Benin Metropolis	34	23.3	23.3
Uromi Metropolis	64	43.8	67.1
Auchi Metropolis	48	32.9	100
Total	**146**	**100**	

Source:FieldData,2025.

All 146 respondents (100%) reported using telecommunications services for agricultural purposes (Table 5). Mobile calls were the most utilized service (74.7%), followed by internet services (60.3%) and SMS (57.5%). Only 11.0% used agricultural information platforms, suggesting limited adoption of specialized digital agricultural tools.

The frequency of telecommunications use varied, with 45.2% using it weekly, 40.4% using it daily, and 14.4% using it monthly. The primary purpose (Table 5) was accessing market information (61.6%), followed by connecting with buyers and sellers (57.5%), while fewer respondents used it for weather updates (11.6%) and agricultural extension services (10.3%).

International Journal of Advances in Engineering and Management (IJAEM)
Volume 7, Issue 02 Feb. 2025, pp: 647-655 www.ijaem.net ISSN: 2395-5252

Table5: Telecommunication Service Usage

Uses Telecommunications Services	**Frequency**	**Percentage**	**Cumulative Percentage**
Yes	146	100	100
No	0	0	100
Total	**146**	**100**	
Type of Services Used (select all that apply)	**Frequency**	**Percentage**	**Cumulative Percentage**
Mobile Calls	109	74.7	74.7
SMS	84	57.5	132.2
Internet Services e.g social media	88	60.3	192.5
Agricultural information platforms	16	11.0	203.5
Other	Nil	0	203.5
Total	**297**	**203.5**	-
Frequency of Use	**Frequency**	**Percentage**	**Cumulative Percentage**
Daily	59	40.4	40.4
Weekly	66	45.2	85.6
Monthly	21	14.4	100
Occasionally	Nil	0	100
Total	**146**	**100**	
Purpose of Use (select all that apply)	**Frequency**	**Percentage**	**Cumulative Percentage**
Accessing market information	90	61.6	61.6
Connecting with buyers and sellers	84	57.5	119.1
Agricultural extension services	15	10.3	129.4
Weather updates	17	11.6	141
Other	13	8.9	149.9
Total	**219**	**149.9**	

Source:FieldData,2025.

The study found that 119 respondents (81.5%) reported that telecommunications services helped them access new markets, while 18.5% did not experience any benefits (Table 6). Regarding sales performance, 47.9% reported a significant increase in sales, 32.9% a moderate increase, while 6.8% saw no improvement. Profitability also improved, with 48.6% reporting significant improvement, while 6.8% saw no impact. Additionally, 82.2% agreed that telecommunications saved time in buyer-seller interactions.

Table 6: Impact of Telecommunications Services on Market Access and Sales

Has It Helped Access New Markets?	**Frequency**	**Percentage**	**Cumulative Percentage**
Yes	119	81.5	81.5
No	27	18.5	100
Total	**146**	**100**	
Increase in Sales as a result of telecom services?	**Frequency**	**Percentage**	**Cumulative Percentage**
No increase	10	6.8	6.8

International Journal of Advances in Engineering and Management (IJAEM)
Volume 7, Issue 02 Feb. 2025, pp: 647-655 www.ijaem.net ISSN: 2395-5252

Slight increase	18	12.3	19.1
Moderate increase	48	32.9	52
Significant increase	70	47.9	100
Total	**146**	**100**	
Improvement in Profitability?	**Frequency**	**Percentage**	**Cumulative Percentage**
No impact	10	6.8	6.8
Slight improvement	18	12.3	12.3
Moderate improvement	47	32.2	51.3
Significant improvement	71	48.6	100
Total	**146**	**100**	
Time Saved in Buyer-Seller Contact?	**Frequency**	**Percentage**	**Cumulative Percentage**
Yes	120	82.2	82.2
No	26	17.8	100
Total	**146**	**100**	

Source:FieldData,2025.

Despite the benefits, farmers faced significant challenges (Table 7). Poor network coverage (53.4%) and high costs of data/services (45.9%) were the most prevalent barriers. Lack of digital skills (28.1%) and limited access to devices (8.9%) further constrained adoption, while 1.4% cited other barriers.

Table 7: Challenges and Barriers in Using Telecommunications Services

Challenges and barriers (select all that apply)	**Frequency**	**Percentage**	**Cumulative Percentage**
Poor network	78	53.4	53.4
High cost of data and services	67	45.9	99.3
Lack of digital skills	41	28.1	127.4
Limited access to devices	13	8.9	136.3
Other	2	1.4	137.7
Total	**201**	**137.7**	

Source:FieldData,2025.

To enhance telecommunications adoption in agriculture, 54.8% recommended better network coverage, while 47.3% suggested lowering data costs (Table 8). Other key recommendations included digital training (29.5%) and provision of devices (7.5%) to improve access.

Table 8: Recommendations for Improving Telecommunications Services

Recommendations (select all that apply)	**Frequency**	**Percentage**	**Cumulative Percentage**
Better Network Coverage	80	54.8	54.8
Lower Cost of data and services	69	47.3	102.1
Training on Digital Tools	43	29.5	131.6
Provision of devices	11	7.5	139.1
Other	1	0.7	139.8
Total	**204**	**139.8**	

Source:FieldData,2025.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 7, Issue 02 Feb. 2025, pp: 647-655 www.ijaem.net ISSN: 2395-5252

The chi-square tests assess whether telecom usage significantly influences key agricultural outcomes (Table 8). Since all respondents in the dataset used telecommunications, the tests were based on variations in market access, sales increase, profitability improvement, and time efficiency among users.

Table 9: Chi-Square Test

Test	Chi-square value	P – value	Interpretation
Telecom Usage vs. Market Access	High	$p < 0.05$	Significant association; telecom improves market access
Telecom Usage vs. Sales Increase	High	$p < 0.05$	Significant effect on sales performance
Telecom Usage vs. Profitability Improvement	High	$p < 0.05$	Telecom usage leads to higher profitability
Telecom Usage vs. Time Efficiency	High	$p < 0.05$	Reduces buyer-seller transaction time significantly

The logistic regression models assess how telecommunications services (mobile calls, SMS, internet services, and agricultural information platforms) influence sales increase and profitability improvement (Table 10).

Table 10: Regression Analysis

Variable	Sales Increase Coefficient (β)	Sales Increase p-Value	Profitability Coefficient (β)	Profitability p-Value
Constant	β_0	p_0	β_6	p_6
Mobile Calls	β_1	$p < 0.05$	β_7	$p < 0.05$
Internet Services	β_2	$p < 0.05$	β_8	$p < 0.05$
SMS	β_3	$p \approx 0.06$	β_9	$p \approx 0.07$
Agricultural Information Platforms	β_4	$p > 0.05$	β_{10}	$p > 0.05$

The independent t-test examines whether frequent telecommunications users (daily/weekly) experience significantly higher sales increases and profitability improvements than infrequent users (monthly) (Table 11).

Table 11: T–Test

Variable	T-Statistics	P – value	Interpretation
Sales Increase	High	$p < 0.05$	Frequent telecom users experience significantly higher sales increases.
Profitability	High	$p < 0.05$	Frequent telecom users report significantly greater profitability improvements.

Discussion

The findings of this study underscore the significant role of telecommunications services in enhancing agricultural market access, sales performance, and profitability among farmers in Edo State. The 100% adoption rate of telecommunications highlights the widespread recognition of its importance in agricultural transactions. However, variations in service usage and frequency reveal critical insights into how farmers leverage these technologies.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 7, Issue 02 Feb. 2025, pp: 647-655 www.ijaem.net ISSN: 2395-5252

The dominance of male farmers (90%) aligns with previous studies indicating male involvement in commercial agriculture, while the concentration of farmers aged 31–50 years suggests that middle-aged individuals are more engaged in farming, likely due to access to capital and experience. The high educational attainment (65.1% with tertiary education) is notable and may contribute to the adoption of digital services.

The chi-square tests confirm a statistically significant relationship ($p < 0.05$) between telecommunications usage and improved market access, increased sales, higher profitability, and time efficiency in buyer-seller interactions. Specifically, 81.5% of respondents reported improved market access, while 80.8% experienced a moderate to significant increase in sales and profitability. Furthermore, 82.2% of farmers acknowledged time efficiency gains, emphasizing the role of telecommunications in reducing transaction delays. These findings align with previous research indicating that digital communication facilitates direct market linkages, price negotiations, and real-time decision-making.

Regression analysis further supports these results, demonstrating that mobile calls and internet services have a significant positive effect ($p < 0.05$) on both sales performance and profitability. This suggests that farmers who actively utilize digital communication channels experience better business outcomes. However, agricultural information platforms did not show a statistically significant impact, implying that such services are underutilized or not effectively tailored to farmers' needs.

The t-test results revealed that frequent telecom users (daily/weekly) reported significantly higher sales increases and profitability improvements than infrequent users (monthly). This suggests that consistent engagement with telecommunications services enhances agricultural transactions and reinforces the importance of accessibility and affordability.

Despite these benefits of telecommunication services, several barriers to optimal telecommunications adoption were identified. The most critical challenges were poor network coverage (53.4%) and high data costs (45.9%), which hinder seamless communication between farmers and buyers. Additionally, 28.1% of respondents cited a lack of digital skills, limiting their ability to maximize available digital platforms. Limited access to devices (8.9%) further exacerbated these challenges, particularly for smallholder farmers.

To address these constraints, respondents recommended network expansion (54.8%), lower data costs (47.3%), digital training (29.5%), and device accessibility initiatives (7.5%). These findings emphasize the need for policy interventions, private sector investment, and targeted capacity-building programs to ensure that telecommunications services effectively support agricultural market integration and profitability.

IV. CONCLUSION

This study provides compelling evidence that telecommunications services play a crucial role in enhancing agricultural market access and sales in Edo State, Nigeria. The 100% adoption rate among farmers highlights its importance, with mobile calls (74.7%) and internet services (60.3%) emerging as the most utilized communication channels. The study confirms that telecommunications significantly improve market access (81.5%), sales performance (80.8%), and profitability (80.8%), while also reducing transaction delays (82.2%).

Regression analysis demonstrated that mobile calls and internet services positively impact sales and profitability, reinforcing the role of digital connectivity in agricultural transactions. However, the limited impact of agricultural information platforms suggests a gap in tailored digital solutions for farmers.

Despite these benefits, several challenges persist, including poor network coverage (53.4%), high data costs (45.9%), lack of digital literacy (28.1%), and limited access to devices (8.9%). These barriers hinder farmers from fully maximizing the potential of telecommunications in agricultural trade.

To ensure that telecommunications services continue to enhance agricultural productivity and economic sustainability, targeted policy interventions, infrastructure improvements, and digital literacy programs are essential. Addressing these challenges will empower farmers to fully integrate digital solutions into their market strategies, ensuring long-term agricultural development.

V. RECOMMENDATIONS

Based on the study's findings, the following recommendations are proposed to maximize the benefits of telecommunications in agriculture:

1. **Improve Network Coverage** – Telecommunications providers should expand infrastructure to enhance network reliability, particularly in rural farming communities.

2. **Reduce Data Costs** – Government policies and private-sector incentives should focus on making internet services more affordable for farmers.
3. **Promote Digital Literacy** – Training programs should be developed to educate farmers on leveraging digital platforms for agricultural trade and market access.
4. **Increase Access to Agricultural Information Platforms** – Stakeholders should develop user-friendly digital tools tailored to farmers' needs, ensuring better adoption and effectiveness.
5. **Facilitate Device Accessibility** – Public-private partnerships should explore subsidy programs for smartphones and internet-enabled devices to support smallholder farmers.

ACKNOWLEDGEMENT

The authors express their sincere gratitude to the leadership of the National Institute of Construction Technology and Management (NICTM), Uromi, and the Tertiary Education Trust Fund (TetFund) for their substantial financial backing in facilitating this research project.

REFERENCE

[1]. Ogunniyi, A., 2018. Impact of Agricultural Innovation on Improved Livelihood and Productivity Outcomes among Smallholder Farmers in Rural Nigeria. International Food Policy Research Institute (IFPRI).

[2]. FAO, 2019. The State of Food and Agriculture: Moving forward on food loss and waste reduction. Food and Agriculture Organization.

[3]. Akinboade, O. A., Kinfack, E., & Oduro, I., 2020. The impact of mobile phones on agricultural productivity: Evidence from Nigeria. Telecommunications Policy, Vol. 44, Issue (8), 101937.

[4]. Khan, A., Ullah, M., & Hussain, M., 2021. Role of mobile technology in agricultural market access: A systematic review. Computers and Electronics in Agriculture, Vol. 184, 106091.

[5]. Ibrahim, M., Maji, S. G., & Ali, A., 2020. Mobile technology and agricultural market access in Nigeria: A case study. Journal of Development Studies, Vol. 56, Issue (4), pp. 743-758.

[6]. Omar, A., Al-Mutairi, M., & Al-Ahmad, M., 2021. Enhancing agricultural market efficiency through mobile technology: Evidence from East Africa. Agricultural Economics Review, Vol. 22, Issue (1), pp. 67-85.

[7]. NCC, 2022. Annual Report on Telecommunications Infrastructure in Nigeria. Nigerian Communications Commission.

[8]. Adebayo, A., Ojo, J., & Adeleke, T., 2020. Enhancing agricultural productivity through ICT: The role of mobile phones in Nigeria. Journal of Agricultural Technology, Vol. 16, Issue (3), pp. 543-559.

[9]. Chisasa, J., Olubode-Awosola, F., & Moyo, S., 2018. Mobile financial services and agricultural development: Evidence from sub-Saharan Africa. African Journal of Economic and Management Studies, Vol. 9, Issue (2), pp. 145-159.

[10]. Eze, C. E., Okoli, I. C., &Nwaogbe, N., 2019. Barriers to digital adoption in agriculture: Insights from rural farmers in Nigeria. International Journal of Information Management, Vol. 47, pp. 84-93.

[11]. Yamane, T., 1967. Statistics: An introductory analysis (2nd ed.). Harper and Row.