



ASSESSMENT OF THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGY BY PUBLIC AND PRIVATE AGRICULTURAL EXTENSION AGENTS IN THE DELIVERY OF SERVICE IN NIGER STATE

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ABSTRACT

This study assessed the use of Information and communication technology by public and private agricultural extension agents in Niger State, Nigeria.. A multi-stage sampling technique was used to select 120 extension agents (60 public extension agents and 60 private extension agents) and 120 farmers in the study area. Primary data were collected using a well-structured questionnaire, focus group discussion and key informants interview. The data collected were analyzed using statistical package for social sciences (SPSS) and participatory Rural Appraisal (PRA) techniques. The result shows that majority (66.7%) of public extension agents were within the age range of 50-59 years. Also a high number (58.3% of private extension agents were within the age range of 40-49 years. Majority (93.3%) of public extension agents were males and also majority (75.0%) of private extension agents were males. So also a high number (53.3%) of the public extension agents had HND as their highest educational Qualification with 21 and above years of experience in service delivery. A high number (50.0%) of the private extension agents had Bachelor Degree as their highest educational qualification with majority (63.3%) of them having 11-20 years experience in service delivery. Mobile apps mobile cinema, what apt, radio and face book were the major ICT tools available for service delivery among both public and private extension agents in the study area. Majority (60.0%) of the public extension agents used ICT tools for their personal affairs instead of service delivery and also a high number (56.7%) of the private extension agents used tools also for their personal matters rather than for service delivery. The same finding equally indicated that the ICT tools used for service delivery were owned by both public and private extension agents which constitutes majority (83.3%) and 65.0%) in the study area. Therefore, from the findings of the study, it was concluded that information and communication technologies (ICTs) are being used by both public and private extension agents not only for service delivery but for their personal matters in the study area. The research work recommended that extension agents should be encouraged to adopt the use of ICTs for service delivery in the study area by given them technical and financial support.

Key words. Assessment, Use, ICT, Public Extension Agents, Private Extension Agents, Delivery of Service

INTRODUCTION

1.1: Background to the Study

Information and communication technologies (ICT) have been in use in many parts of the world by agricultural public and private extension agents in order to enhance agricultural extension services to the farmers. The emergence of information and communication technologies (ICT) heightens the activities of

extension service, this is because it emerged with different tools and facilities that changes the status and well-being of the farmers (United Nation 2019). ICT tools also enhances the ways of reducing service drudgery through transformation of farming societies from traditional to scientific based especially in the developing Nations (Shama and Mardene 2019).

The use of ICT tools became an umbrella term that encompasses all communication services. The world's technological capacities designed to compute information with humanity guided general purpose computers grew from 3.0x10⁸mps in 1986 to 6.4x10¹² MIPS in 2007 (Anderson & Feder, 2007). ICT development index (IDI) evaluates and contrast the adoption of ICT development and availability digital technologies globally (Smith, 2020). According to international communication union (2014), Denmark leads the most recent rankings with South Korea in second place. Digital technology can play the role of ensuring equal educational technologies and opportunities by improving quality and supporting education (Fadiji *et al.*, 2023).

The use of Information and Communication Technology (ICT) has been recognized as a potential solution to improve the delivery of extension services to farmers (Aker, 2011).

The agricultural sector plays a vital role in Nigeria's economy, contributing significantly to the country's GDP and employing a large proportion of the workforce (Adeoti, 2018). Within the agricultural sector, agricultural production is a significant sub-sector, providing a source of income for many farmers and contributing to food security (FAO, 2020). However, agricultural extension services have been identified as a critical factor in improving the productivity and efficiency of farmers (Anderson and Feder, 2017). ICT-based extension services can provide farmers with access to relevant information, advice, and knowledge, enabling them to make informed decisions and improve their productivity (Munyua, 2000).

In Nigeria, the Niger State has a significant number of farmers, and the use of ICT-based extension services has the potential to improve their productivity and efficiency. However, there is limited research on the usage of ICT-based extension services among Agricultural Public and private extension agents (AEA) in the Niger state particularly in the context of

agricultural production. The rapid improved in agricultural development was due to the increase in the use of ICT tools in agricultural extension service particularly in the developed Nations and some Sub-Saharan African countries including Nigeria in farming. Recent research reported that, the use of ICTS tools in the delivery of agricultural extension service have impacted positively particularly in the area of production (Irungu, 2020). Extension workers across the world depend heavily on ICT tools in the disseminating of many farming information. The quest for knowledge and access to current or trending information based on modifications and updates created an unrestricted access to the spread of technological advancement (Bernard, 2021).

METHODOLOGY

2.1 Study Area

This study was conducted in Niger State. It is located between Latitudes 9°22'N and 11°30'N and Longitudes 7°30'E and 11°20'E. The State is bordered by Zamfara and Kebbi States in the North and North-west respectively, Kogi State and Kwara State in the South and South-west respectively; while Kaduna State and the Federal Capital Territory, Abuja, border the State to the Northeast and Southeast respectively. The State shares an international boundary with the Republic of Benin at Babanna, in Borgu LGA. Currently, the State covers an estimated total land area of 76,363sq.km, which is about 9.3% of Nigeria's total land area. The population of the State is estimated to be 6,783,300 at 3.4% growthrate (National Bureau of Statistic(NBS), (2022).

The State is divided into three agricultural Zones, namely: Zone 1, with headquarters at Bida, Zone II, with headquarters at Kuta and Zone III, with headquarters at Kontagora. The average annual rainfall in the State is 1,219 mm. The dry season is between November and March. Temperature is fairly regular and ranges

from 26.1⁰C (June – February) to 30.3⁰C (March – April) (Kolapo&Adeyera, 2021). Niger State is populated mainly by the Nupe people in the South, the Gwari in the east, the Busa in the west, and Kambari (Kambari), Hausa, Fulani, Kamuku, and Dakarki (Dakarawa) in the North. Islam is the predominant religion.

Most of the inhabitants are engaged in farming shea nuts, yams, and groundnuts are cultivated both for export and domestic consumption. Sorghum, millet, cowpeas, corn (maize), sugarcane, and fish are also important in local trade

Minna and Bida are the State's major towns and also the main education centres, with teacher-training colleges, a polytechnic institute in Bida, and a Federal University of Technology in Minna. Near Bida there is a National Cereals Research Institute Baddegi and an agricultural research station. A railway from Lagos traverses Niger State. The main highway system runs north of the railway and serves the market towns of Mokwa, Kontagora, Tegna, Kagara, and Kuseriki. The State's other large towns are served by networks of local roads.

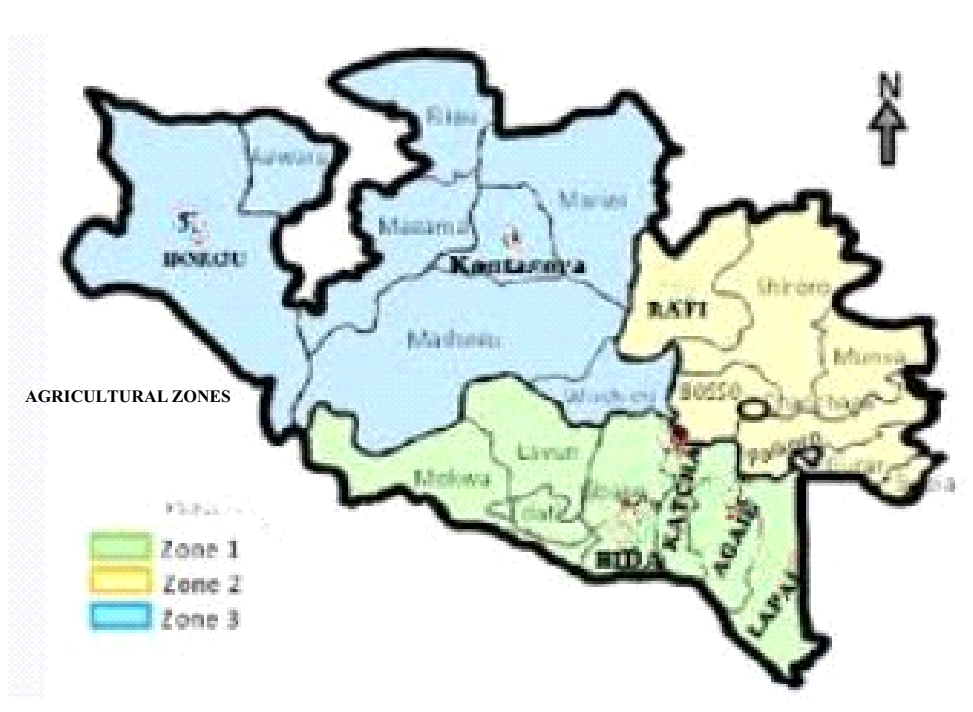


Figure 2.1: Map of Niger State showing the study Location.

Source: Field Survey, 2025

2.2 Sampling Techniques and Sample Size

Multi stage sampling technique was employed to select Public and private agricultural extension agents in the study area. The first stage involved convenient selection of three agricultural zones in the study area (Lapai Agricultural Zone (I), Shiroro in Agricultural Zone (II) and Wushishi in Agricultural Zone (III)). The second stage involved a random selection of Public and private Agricultural extension agents in each agricultural

zones. One Hundred and Twenty (120) public and private agricultural extension agents (Sixty each) and One Hundred and Twenty (120) Farmers constitutes the sample size for the study and were selected from a sample frame of 198 public and private agricultural extension agents and 12,200 farmers obtained from Niger State Agricultural Development Project (ADP). Below is the table of sample procedure and sample size for the study.

Table 2.1: Sampling Techniques and Sample Size

Agricultural Zone	Sampling frame of Extension agents	Sampled size of Extension agents	Sample frames of farmers	Sample size of farmers
Zone I	71	40	4,800	40
Zone II	68	40	4,200	40
Zone III	59	40	3,200	40
Total	198	120	12,200	120

Source: Field Survey, 2024

2.3 Methods of Data Collection

Primary data were collected using both quantitative and qualitative technique. In quantitative technique, a well-structured questionnaire containing both open and close ended questions was used. While in qualitative technique a focus group discussions and key informant interview were employed. Textbooks and Journals were used as reference materials

2.3.1 Validity of Data Collection Instrument

To establish the validity of the research instrument, face validity was adopted. The research instrument (questionnaire) was subjected to the scrutiny of my supervisors and three other professionals in the field of agricultural extension to ascertain the validity of the instrument. The experts rated each item on a scale of 1–10. Their recommendations were used to finally modify the questionnaire as a formal tool that had the ability to elicit the expected information for the data.

2.3.2 Reliability of Data Collection Instrument Test

In this study, the instrument used for data collection (questionnaire) was tested for reliability using the test-retest method to assess its reliability. The process involved randomly selecting few respondents outside the study area. The selected respondents were then be administered with the instrument and the same respondents were retested after three-week interval.

2.4 Data Analysis

The quantitative data collated from the administered questionnaires were analyzed using statistical package for Social Sciences (SPSS version 26). While the qualitative data were analyzed using Participatory Rural Appraiser (PRA) techniques. Objectives 1, 2, 3 and 4 were analyze using descriptive statistic such as frequency count and percentages while objectives 5 and 6 were achieved using matrix-ranking analyses (MRA).

2.4.1: Matrix Ranking-Analysis (MRA)

This is one of the core-tools used in Participatory Rural Appraisal (PRA). It is a process of ranking a set of options using head to head pairs to judge which one is the most preferred overall. It is use to rank people's preferences by voting at a scale. It is mostly use by community development workers as a means of prioritizing people's needs.

The model of MRA is express as follows:

If an individual or organization expresses a preference between two mutually distinct alternatives the preference can be express as $X > Y$ or “PY (if an individual prefers x) “ $Y > X$ ” or “YR” (if any individual prefers Y over X) “ $X = Y$ ” or “XLY” (if any individual is indifferent between both alternatives).

RESULTS AND DISCUSSIONS

3.1: Socio-Economic Characteristics of Respondents

This present information on age, sex, educational qualification, marital status, family size and years of experience of service of the respondents.

3.1.1: Age of the Respondents

Table 3.1 shows that majority (66.7%) of public agricultural extension agents in the study area were within the age range of 50-59 years. 16.7% of them were within the age range of 40-49 years. 11.7% of them were within the age range of 30-39 years and only 5.0% of them were within the age range of 60 and above years. While in the private extension agents, a high number (58.3%) of them were within the age range of 40-49 years. 25.0% of them were within the age range of 50-59 years and only 3.3% of them were within the age range of 60 and above years (Table 3.1)

This implies that majority of public extension agents in the study area were within the age range of 50-59 year, indicating that they are old and experienced workers, than the private extension agents. This finding corroborates that of Smith (2020) who reported that majority of extension agents who are in the public extension service are

old ages compared to those in private extension service in West Africa. This was equally substantiated by Irugu (2020) who revealed that public extension agents in Nigeria are old who do not have upto date knowledge of modern extension systems but are more experienced than private agents.

3.1.2: Sex of the Respondents

Table 3.1 indicated that, majority (93.3%) of public extension agents in the study area were males and only 6.7% were females. while the majority (75.0%) of the private extension agents in the study area were males and 25.0% of them were females. This implies that private extension have more female extension agents than public extension organizations in the study area. This result is in agreement with that of Wolfert (2022) who revealed that in Sub-Sahara Africa, there are low female inclusiveness in extension service, particularly in public extension organizations. Women participation is usually less than 10.0%. This is also in line with the report of Purnomo (2020) who posited that female extension agents participate more in private extension service than in public extension service.



Table 3.1: Socio-economic characteristics of Respondents

Characteristics	Frequency	Public Ext. Agents Percentage	Frequency	Private Ext. Agents Percentage
Age Range/Years				
30-39	7	11.7	15	25.0
40-49	10	16.7	35	58.3
50-59	40	66.7	8	13.3
61 and above	3	5.0	2	3.3
Sex				
Male	56	93.3	45	75.0
Female	4	6.7	15	25.0
Qualifications				
NCE	5	8.3	4	6.7
ND	10	16.7	6	10.0
HND	32	53.3	15	25.0
B.Sc.	13	21.7	30	50.0
M.Sc.	0	0.0	5	8.3
Ph.D.	0	0.0	0	0.0
Marital Status				
Married	41	68.3	19	31.7
Single	4	6.7	31	51.7
Divorced	5	8.3	4	6.7
Widow	8	13.3	2	3.3
Separated	2	3.3	2	3.3
Family Size				
1-5	15	25.0	40	66.7
6-10	25	41.7	12	20.0
11-15	14	23.3	6	10.0
16 and above	6	10.0	2	3.3
Income Level/Month				
Less than N100,000	7	11.7	11	18.3
N100,000-N200,000	42	70.0	45	75.0
N300,000 and above	11	18.3	4	6.7
Experience in Science				
1-10 years	7	11.7	15	25.0
11-20 years	8	13.3	38	63.3
21 years and above	45	75.0	7	11.7
Total	60	100.0	60	100.0

Source: Field Survey, 2025

3.1.3: Educational Qualification of Respondents

Table 3.1 revealed that a high number (53.3%) of public extension agents in the study area have HND as their highest educational qualification. 21.7% of them have B.Sc. as their highest educational qualification and 5.3% of them have NCE as their highest educational qualifications.

While in the private extension in the study area, the same result shows that a good number (50.0%) of the extension agents have B.Sc. as their highest educational qualification 25.0% of them have HND as their highest educational qualifications, 10.0% of them have ND as their highest educational qualifications 8.7% of them have M.Sc. as their highest educational

qualifications and only 6.7% of them have NCE as their highest educational qualifications in the study area.

This implies that private extension agents have more Bachelor Degree graduates than public extension agents in the study area. This result is in line with Smith (2020) who reported that majority of public extension agents in Sub-Saharan Africa have ND and HND, with less modern theoretical and practical knowledge and this hinders agricultural extension service delivery. The findings also corroborates that of Pumomo (2020) who posited that agricultural extension workers in West Africa lack of up to date theoretical and practical research and this hinders success in agricultural development.

3.1.4: Marital Status of Respondents

Table 3.1 shows that majority (68.3%) of public extension agents in the study area were married. 13.3% of them were widows, 8.3% of them were divorced. 6.7% of them were singles and only 3.3% of them were separated. While private extension agents, a good number (51.7%) of them were singles. 31.7% of them were married. Divorced and widows constitutes 6.7% each and only 3.3% of them were separated (Table 4.1)

This implies that majority of both public and private extension agents were married with one family responsibilities or the other. Therefore, this finding agreed with that of Irugu (2020) who reported that majority of both public and private agricultural extension agents in Africa were married with family responsibilities on them.

3.1.5: Family Size of Respondents

Table 3.1 revealed that 41.7% of the public extension agents have family size of 6-10 members. 25.0% of them have a family size of 1-5 members. 23.3% of them have 11-15 members and only 10.0% of them have a family size of 16 and above members. While in private

extension agents, the result indicated that majority of (66.7%) of them have family size of 1-5 members. 20.0% of them have a family size of 6-1- members and only 3.3% of them have a family size of 16 and above members (Table 3.1) This implies that public extension agents in the study area have more family members than private extension agents in the study area, indicating that they have more family responsibilities than private extension agents. This findings strongly disagreed with that of Irugu (2020) who reported that public extension agents have less households size than that private extension agents in West Africa Nations.

3.1.6: Income Level of Respondents

The result (Table 3.1) revealed that majority (70.0%) of public extension agents have an income level of N100,000 - N200,000 per month. 18.3% of them have N300,000 and above per month. While in private extension, majority (75.0%) of them have an income level between N100,000 – N200,000 per month. 18.3% of them have an income level of less than N100,000 per month and only 6.7% of them have an income level of N300,000 and above per month (Table 3.1)

This implies that both public and private extension agents in the study area have an income level of equal range indicating their similar standard of living. This finding coincides with that of Smith (2020) who reported that agricultural extension agents in West Africa (both public and private) have the same level of incomes with little variations among key individuals among them.

3.1.7: Years of Experience in Service of Respondents

The result shows that majority (75.0%) of public extension agents in the study area have 21 and above years of experience in extension service. 13.3% of them have 11-20 years of extension

service and 11.7% of them have 1-10 years of extension service. While in private extension, majority (63.3%) of them have 11-20 years of extension service. 25.0% of them have 1-10 year experience in extension service and 11.7% of them have 21 and above years of experience in extension service (Table 3.1)

This implies that public extension agents have more years of experience in extension service than private extension agents. This finding is in line with that of Smith (2020) who reported that public extension service delivery was the earliest extension system in West Africa. The private extension system is recently and has been with few of extension agents in some parts of West Africa. This implies that public extension system is more popular than private extension system in Nigeria.

3.2: Available ICT Tools used by Respondents in Study Area

This present information on available information communication tools used by public and private extension agents in the study area.

Table 3.2 shows that 13.8% of the public extension agents have whatsapp as the most available ICT tool used by them. , 13.8% revealed mobile cinema as the most available ICT tool used by them. 11.5% of them, radio as an available ICT tool. 10.3% used mobile apps,

Facebook and television constitutes 9.2% each of the respondents, 8.3% have computers, while 7.8% have projectors as the only and available ICT tool in the study area. 7.1% have internets and also 7.1% have weather forecasting tools. 1.0% of them have GIS and remote sensing tools. 0.7% have mobile cinema and only 0.5% of them have web platforms.

The result equally shows that 15.6% of the private extension agents uses whatsapp. 15.1% have mobile apps. 14.6% have internet. 13.3% uses Facebook. 12.8% uses computers. 10.7% have weather forecasting tools. 7.0% have radios. 3.1% uses mobile cinemas. 2.6% have used projectors. GIS and remote sensing and video conferences and weather forecasting tools have 1.3% each. This implies that ICT tools are currently in use at the study area. Many of those available tools are used by both public and private extension agents. (Table 3.2)

This result coincides with that of Smith (2020) who reported that many ICT tools are available in the developing Nations and are being used by both public and private extension agents. The same finding also substantiate that of Irugu (2020) who revealed that ICT tools available in West Africa are currently being utilize by both private and public extension agents in the delivery of service.



Table 3.2: Available ICT Tool used by Public and Private Extension Agents in the study area (n=Private= 60, Public= 60)

Available ICT Tools	Frequency	Public Ext. Agents Percentage	Frequency	Private Ext. Agent Percentage
Mobile Apps	45	10.3	58	15.1
Web Platforms	2	0.5	5	1.3
Facebook	40	9.2	51	13.3
What Sapp	60	13.8	60	15.6
GIS & Remote Sensing	4	1.0	5	1.3
Radio	50	11.5	27	7.0
Weather forecasting Tools	31	7.1	5	1.3
Television	40	9.2	41	10.7
Computer	36	8.3	49	12.8
Internet	31	7.1	56	14.6
Projectors	34	7.8	10	2.6
Mobile Cinema	60	13.8	12	3.1
Video	3	0.7	5	1.3
Conference				
Total	436	100.0	384	100.0

Source: Field Survey, 2025 (Multiple Responses Recorded)

3.3: Level of Usage of ICT Tools by Respondents

This present information on the level of usage of ICT tools by both public and private extension agents in the study area.

3.3.1: Level of Usage

Table 3.3 revealed that majority (66.7%) of the public extension agents in the study area have a full-used of ICTs tools. 21.7% of them have partial used of ICT tools and only 11.7% of them were not using ICTs tools in the study area. While private agricultural extension agents, majority (66.7%) of them have full-used of ICT tools in the study area. 11.7% of them have a partial-used of ICT tools, 11.7% have a partial-used of ICT tools and only 5.0% were not using ICT tools in the study area.

This implies that majority of public and private extension agents in the study area have a full-used of ICT tools in the study area. This result

corroborates that of Musshoff (2020) who reported that majority of agricultural extension agents in the tropical area have a full-used of ICT tools. The result is also supported by Elahi *et al*; (2021) who revealed that ICT tools are highly used among extension agents in West Africa.

3.3.2: Type of Usage of ICT Tools

Table 3.3 further indicated that majority of public agricultural extension agents use ICT tools for their personal affairs but not for the delivery of services and this constitutes 60.0% of the respondents. 26.7% of them use it for both personal and service delivery and 13.3% , only for delivery of extension service. Where as in the private extension agents, a high number (56.7%) respondents used ICT tools also for their personal affairs- Also 26.7% used ICT for delivery of service and personal affairs and 16.7% of them said for extension services

delivery only. This implies that both public and private extension agents, majority of them uses ICT tools for their personal affairs. This result is in line with that of Musshoff (2020) and Elahi *et*

al; (2021) who reported that majority of agricultural extension agents in West Africa uses ICT tools not for extension services delivery but for their personal matters.

Table 3.3: Level of Usage of ICT Tools by Respondents (No. Public=60 , Private=60)

Level of Usage	Frequency	Public Ext. Agents Percentage	Frequency	Private Ext. Agent Percentage
Not use	7	11.7	13	5.0
Partially used	13	21.7	7	11.7
Fully used ICT	40	66.7	40	66.7
Type of Use				
Personal Use	36	60.0	34	56.7
Service Delivery	8	13.3	10	16.7
Both Personal and for Service Delivery	16	26.7	16	26.7
Total	60	100.0		100.0

Source: Field Survey, 2025

4.1: CONCLUSION

From the findings of the study, the study concluded that Information and Communication Technologies (ICT) are being used by both public and private extension agents in the study area, not only for the delivery of service but also for their personal affairs. Private extension agents uses ICTs tools for service delivery than public extension agents in the study area.

4.2: RECOMMENDATIONS

From the findings of this study, the study recommended that:-

1: Public extension agents should be encouraged to adopt ICTs extension service delivery, in order to be able to provide more farming information to the farmers in the

study area, this can be done by the government and NGOs

2: Technical and financial support programmers should by provide to the extension agents and farmers in the study area by the government and NGOs in order to promote ICT extension service

3: ICT extension training should be given to both extension agents and farmers as this will promote the use of ICT extension service delivery by the government and NGOs.

4: ICTs facilities should be provided to the extension agents and government and NGOs as this will encourage ICT extension in the study area.

REFERENCES

- Adeoti, A.D., (2018). Awareness, access and usage of information and Communication Technologies among female researchers and extensionists. *International Journal of Education and Development using Information and Communication Technology* 3(1): 85-93.
- Aker, J.C. (2010). Information from markets near and far: mobile phones and agricultural markets in Niger. *American Economic Journal: Applied Economics*. 2: 46–59.
- Ann, E. N. (2013). Public and private extension agents access and utilization of information and communication technology (ICT) in extension service delivery in South East Nigeria. *Journal of Agricultural Extension and Rural Development*. 5(11): 266-276.
- Anderson, P. A. and Feder, E.O. (2007). Accessibility and use of Information and Communication Technologies by Agricultural researchers of in the North Central Zone of Nigeria. *Journal of Agricultural Extension*. 3(6):18-24.
- Bernard, U. H (2021). Internet Delivery of Short Courses for Farmers: A Case Study of Course on Precision Agriculture', RIRDC Publication No. 02/085, Rural Research and Development Corporation, Canberra (online) (Accessed on 12.05.2013) Available at <http://www.rirdc.net/ictcontent/uploads/2005/11/internetdelivery-casestudy.pdf>
- Elahi, I.A., Enwereuzor, S.O., Asadu, A.N., Nwalieji, H.U. and Ugwuoke, B.C. (2021). Access and use of Information and Communication Technologies by Extension Workers in Anambra State Agricultural Development Programme, Nigeria. *Journal of Agricultural Extension*. 21:152-162
- Fadiji, T.O. (2023). Public and private extension agents access and utilization of Information and Communication Technology in extension service delivery in South East Nigeria. *Journal of Agricultural Extension and Rural Development*. 5(11):266-276.
- Munyua, H. (2000) Information and Communication Technologies for rural development and food security: Lessons from field experiences in developing countries. Sustainable Development Department (SD), FAO of the United Nations.
- Musshoff, D. B. (2020) Information and Communication Technologies for rural development and food security: Lessons from field experiences in developing countries. Sustainable Development Department (SD), FAO of the United Nations.
- Purnomo, A.Z. (2020). The duality of technology: rethinking the concept of technology in organisations. *Organisation Science*, 3(3):398-427.
- Shama, M. H. and Mardone (2019). Marketing and rural finance farm radio as a medium for market information dissemination. First International Workshop on Farm Radio Broadcasting. <http://www.fao.org/docrep/003/x6721e/x6721e22.htm> Accessed on 22 June, 2018.
- Smith, A., Goe, W. R., Kenney, M. and Paul, C.J.M. (2004). Computer and internet use by great plains farmers. *Journal of Agricultural and Resource Economics*. 29(3): 481-500.
- UNDP. (2001). Making new technologies work for human development. United Nations Development Programme. Found in <http://www.undp.org/hdr2001>