Direct Research Journal of Agriculture and Food Science
Vol. 11(3) Pp. 54-59, March 2023
ISSN 2354-4147
DOI: https://doi.org/10.26765/DRJAFS12044476
Article Number DRJAFS12044476

Original Research

Technology Usage and Awareness among Smallholder Farmers in Gwagwalada Area Council, Abuja, Nigeria

Samuel Olabode Adeyemi[1]*, Samson Olayemi Sennuga[1], Funso O. Alabuja[2], and Osho-Lagunju Bankole[1]

[1]Department of Agricultural Extension and Rural Sociology, Faculty of Agriculture, University of Abuja. P.M.B. 117 Abuja, Nigeria.
[2]Department of Agricultural Economics, Faculty of Agriculture, University of Abuja, FCT, P.M.B. 117, Abuja, Nigeria.*Corresponding Author E-mail: samueladey@yahoo.co.uk

Received 6 February 2023; Accepted 13 March 2023

ABSTRACT: The usage of ICT has recently received global attention due to its link (both in developed and developing nations) to the adoption of new farming technologies. The purpose of this study was to investigate technology usage and awareness among smallholder farmers in Gwagwalada Area Council, Abuja, Nigeria. It investigated the impact of ICT awareness and use, including radio, television, laptop computer, desktop computer, fax machine, cable television, projector, digital camera tablets, smart phone, and internet, using primary data collected from 100 respondents using structured questionnaires and a simple random sampling technique. The majority of respondents (30%) were between the ages of 36 and 45, with males accounting for 51% and females contributing for 41%. Descriptive (frequency and percentage) and inferential statistics were used to analyze the data. The analysis revealed that the use of modern ICTs such as mobile phones and cable television has a significant impact on the agricultural productivity of smallholder farmers, as evidenced by the respondents' rapid increase in productivity and improvement in their standard of living. Farmers' challenges, however, included high costs, lack of training, and ICT service failure. The Nigerian government should promote a liberal policy that will improve rural infrastructure and provide an enabling environment, and remote residents should have access to the internet and other mobile communication technologies, which would increase their overall use of ICT services.

Keywords: Awareness, smallholder, ICT, farmers, productivity

Citation: Adeyemi, S. O., Sennuga, S.O., Alabuja, F, O. & Osho-Lagunju, B. (2023). Technology Usage and Awareness among Smallholder Farmers in Gwagwalada Area Council, Abuja, Nigeria. Direct Res. J. Agric. Food Sci. Vol. 11(3) Pp. 54-59. https://doi.org/10.26765/DRJAFS12044476

INTRODUCTION

Information and Communication Technologies (ICTs) are technologies that have been accepted globally for the purpose of development because it's one of the main driving forces that can bring about rapid development and change in this present digital age. Its components/devices include Multimedia systems (VCDs, DVDs, VHS, overhead projectors), Telephones (Landlines and Mobile phones), Internet (E-mailing, Web-browsing, telephoning), Radio, Television, Computers, and Personal Digital Assistants (PDAs). Information and Communication Technologies (ICTs) are tools or devices that allow the exchange or collection of data through electronic interaction or transmission (Olorunniyi et al., 2022).

The world today is driven by information where the use of information and communication technologies (ICT) is rapidly being used as the primary force behind social and economic development, including agriculture, not just in

affluent countries but all over the world (Gayi and Tsowou, 2016; Francis, 2016, Sennuga, 2019). However, information should not be seen as the only resource that is needed for development purpose though it's key. The unavailability of ICT tools to the farmers and extension workers has been identified as one of the challenges to Agricultural development. It should be noted that Agricultural extension depends to a great extent on the exchange of information between the extension workers, farmers and research institutions. Going by the World Bank standard of 1:500 of extension worker - farmers and the inadequate numbers of extension workers, use of Radio had been identified to be the saving grace in Nigeria though not meeting the required standard. It enables the extension workers to reach up to half a million smallholder farmers at the same time and especially in their local languages; which made easy the dissemination of knowledge and information to the farmers which they used to solve their problems and applied during the time of taking crucial decision (Oladele, 2015).

The fast development of ICTs has major influence on the livelihood of the people across the world. Conger (2015) observed the significant explosion of the use of ICT over the last two decades. ICT adoption has also been proved in social research to be a major driver of community and economic growth in rural places. However, Chikaire et al. (2017) cited a number of factors that limit the use of ICT, including a lack of understanding, a weak legal framework for exchanging information, issues with infrastructure, insufficient access to a worldwide network, maintenance issues, a lack of research and development, and excessive taxation.

E-agriculture, a developing area of ICT innovation, aims to boost agricultural and rural development through better information and communication systems (Lai-Solarin et al., 2022). Agricultural sector with its role in economic growth and rural development has been attributed to tiny farms, low yields, and few prospects for innovation have been its defining characteristics. By 2050, there will be an estimated 9 billion people on the planet, which has increased the demand for food and put strain on the planet's resources (FAO, 2015). The recent growth in the Industrial and innovative agriculture have shown that it has the ability to spur economic growth, help ensure food security, and provide income for millions of rural farmers that are dominated by small holder farmers and also address the different challenges of the smallholder farmers in the agricultural and food industry however, the limitations and restrictions present in conventional and formal communication channels have increased the relevance of ICT application in the Agricultural sector (Alfa et al., 2022). There is a close connection between credible information and the adoption of new innovation by farmers. This is one of the reasons that made ICT to be very important for all the stakeholders of agriculture: extension workers, farmers and researchers. However, Annor-Frempong et al., (2015) and Sennuga et al., (2020a) corroborated in their opinion that, the communication between the stakeholders should be interactive and that it will create better understanding of opinion and effective feedback.

Despite these limitations, ICT applications are expanding quickly across all industries, which has led to the development of a variety of ICT applications in the agriculture industry to help farmers, extension services, and other sector participants quickly access information. ICTs according to Daum (2020) have evolved into one of the main driving forces extension staff use to communicate agricultural information to farmers. In the submission of Sennuga et al. (2020a), ICT has the power to advance rural areas while simultaneously connecting millions of people, bridging geographic divides, enabling frequent and ongoing connection, capturing the truth of an event, storing, transferring, and receiving data and information. Smartphones such as mobile phones with internet access according to O'Dea, 2020, are the ICT devices that are most widely used globally. Okeke et al. (2015) argued that ICT are among one of the modern tools enabling farmers, extension agents, and other stakeholders like research institutions to access timely information and share knowledge.

At every stage of the agricultural production process, smallholder farmers need information on a variety of topics. Smallholder farmers in Africa have traditionally received the information they need through traditional ICT like radio, newspapers, landlines, and personal exchanges, but using mobile phones can significantly cut the costs of acquiring agricultural information when compared to these modern communication methods (Sennuga, 2019). With certain distinctive and creative uses, mobile communication (GSM) is seeing the most increase in usage among any Technologies on any continent (Irungu et al., 2015; Adangara et al. 2022) which might have been as a result of the strong argument that were advanced in favour of the deployment of ICT for the purpose of agricultural information and the use of the facilities by the farmers. In Nigeria, prior to 2000, ICT uses in the rural area were limited to radio, television and landline telephones. President Olusegun Obasanjo introduced the modern ICT to Nigeria in 2001 which gave birth to the National Telecom Policy (NTP) (National Telecommunications Policy in 2007.

This study highlights the importance of the use of ICTs to promote agricultural transformation which can help smallholder farmers to obtain pertinent information about agricultural inputs, crop production methods, agricultural processing, market assistance, agricultural financing, and farm enterprise management (Nwali et al., 2022).The creation of networks for agricultural communication like

the one used for the distribution of fertilizers under then minister of Agriculture in person of Dr Akinwunmi Adesina, this entails the active participation of all agricultural stakeholders especially the small holder farmers. The purpose of this study is to find out the level of awareness and use of ICT by small holder farmers in Gwagwalada Area Council Abuja, Nigeria based on the following specific objectives:

i. describe the socio-economic characteristics of the respondents in Gwagwalada Area Council;
ii.
iii. determine the availability of ICT in the study area;
iv. find out the level of use of ICT in the study area;
v. examine the constraints to the adoption ICT by the respondents.

MATERIALS AND METHODS

The Study Area, Gwagwalada Area Council is one of the six Area Councils in Abuja the Federal Capital Territory (FCT) located in between latitudes 805515211N and 90113411N, and longitudes 605113611E and 701113511E. (www.wikipedia.org). It is located in the center of FCT and surrounded by highly productive agricultural territory; bordered on the south by Kwali Area Council, on the east by Kuje Area Council, on the north by Suleja (Niger State), and on the east by the border town of Izom. The settlements or communities in the study area are Gwagwalada, Kutunku, Dobi, TungaGayan, Gwako, Dukwa, Dagiri, Paso, Ibwo, Wumi, Zuba, TungaMaje, Giyabiri, Kwaita, Gurfata, Ashara, Ledi, Giri, Kaida, Kuturu, Anagada and a few others. The Area Council's climate is characterized by a number of climatic factors, most notable is the wet and dry seasons. The average annual temperature ranges from 30°C to 37°C, with the highest temperature in March and about 1,650mm of rainfall per year with 60% falling between the months of July to September. The area is drained by the major rivers within the research region which includes River Usuma, and River Gurara. It has a population of 157,770 people (2006 census) with an area of1069.589 square kilometer (www.wikipedia.org).

Population of the study

The study area is dominated by the indigenous Gbagyi people who practiced the three common religion in Nigeria viz Christianity, Islam and Traditional. They speak one common language. Agriculture is the most important economic activities in Gwagwalada Area Council due to the favorable climate and soil conditions. The occupation of most of the indigenous people is agriculture: peasant farming, logging, pond fishing, and animal farming. Very few people engage in hunting and small-scale business while few are civil servants. Yam, maize, millet, groundnut, rice, beans, melon, sweet potato, cassava, guinea corn, and vegetables like pepper and tomato are the main food crops farmed.

Methodology and research design

Sampling techniques

The similarities in the occupation, religion, beliefs, culture and tradition of the people in the study area were put into consideration and coupled with the fact that any member of the communities that may be selected favoured the simple random sampling method chosen for the study.

Sample size

For the purpose of this research, 20 farmers were randomly selected from each of the chosen communities in Gwagwalada Area Council viz: Gwagwalada, Dobi, TunganMaje, Gwako and Anagada communities were chosen given a total of 100 participants based on the similarity in their climatic, environmental and socioeconomic conditions. Criteria used are voluntary participation, age of between 0 and 60 years, permanent resident, farming and ICT experienced.

Method of data collection

Data were collected using structured questionnaires. The key themes in the survey included socio-economic characteristics of smallholder farmers, age, household size, level of education, gender, years of farming, position in the value chain, level of awareness and use of ICT, constraints to the adoption of ICT and the availability of ICT.

RESULTS AND DISCUSSION

Table 1 demonstrates that there are more male farmers (51%) in the age group of 36-45 (30%) engaged in agricultural business than the others (based on frequency and percentages). It also revealed that the majority of smallholder farmers (52%) are married, and that more than half of these houses (62%) had 10 or more people, with some of the remaining houses having larger families of 15 or more, implying polygamy in the communities, where cultural custom and religion clearly prohibit men from marrying more than four women.

The level of their education is adequate for farmers to learn, adopt and be able to use ICT effectively coupled with the fact that most respondents were in their prime for economic activity of 36-45 years which will enhance their ICT device productivity and use for pertinent agricultural information for the purpose of agricultural production

Table 1: Socio-economic characteristics of respondents

Personal Characteristics	Percentage (%)
Age (Years)	
0 – 25	17.0
26 – 35	25.0
36 – 45	30.0
46 – 55	20.0
56 and above	8.0
Gender	
Male	51.0
Female	49.0
Marital status	
Single	11.0
Married	52,0
Divorced	10.0
Widowed	13.0
Separated	14.0
Household size	
<10	62.0
11 – 15	26.0
16 – 20	12.0
21 – 25	0.0
26 – 30	0.0
Educational qualification	
Adult education	14.0
Primary education	22.0
Vocational education	37.0
Secondary education	27.0
Hnd/BSc	0.0
Length of the period of farming (Years)	
< 5	24.0
6 – 10	32.0
11 – 15	22.0
16 – 20	22.0
21 – 25	0.0
26 and above	
Position in the value chain	
Producer	51.0
Marketer	17.0
Processor	32.0

Table 2: Age and education not cited and not discussed, author should cite it and discussed it

	X	Range	Mean	SD	Decision
Age	5	22.00	20.00	8.33	S
Education	6	37.00	16.66	14.90	S

based on the general assumption that younger people tends to produce more than their senior colleagues. The results in Table 1 above showed more males respondents in line with Sennuga et al. (2020b) that opined the cultural traditions do not allow females to be actively involved in farming activities.

The positive and significant results of the descriptive statistics of the age and education from the table above is a clear indication of their influence on ICT which corresponds with the findings of Mwangi and Kariuki (2015) who opined that the adoption was influenced by the socioeconomic characteristics of farmers and new innovations.

Table 2 revealed the difference in the level use of ICT despite that their age and education being adequate for the use of ICT. The positive and significant results of the descriptive statistics of the age and education from the (Table 2) above is a clear indication of their influence on ICT which corresponds with the findings of Mwangi and Kariuki (2015) who opined that farmers' socio-economic characteristics had an influence on the adoption of new innovations. The level of the availability of the following ICT: Laptop computer, Desktop computer, Fax machine, Cable television, Projector, Digital Camera and Tablets were surveyed, the results revealed a low level showing only smart phones, television and radio. It was also found that 78% are aware of the availability of smart phones, 78% of television and 72% of radio. Table 3 indicates the mean result (87.81) which corroborates the low level of the availability of ICT in the study area backed up by

Table 3: Level of availability of ICT

	X	Mean	SD	t-test value	Decision
Yes	100	12.18	25.87	-9.23	NS
No	100	87.81			

Table 4: Level of awareness and use of (ICT)

Level of awareness of ICT							Level of use of ICT					
	X	Range	Mean	SD	X^2	Decision		X	Mean	SD	t-test value	Decision
High	5	1.00	0.8000	0.44721	87.0	S	Yes	5	33.20	36.64	-1.83	NS
Moderate	5	87.00	32.4000	36.12894			No	5	66.80			
Low	5	88.00	66.8000	36.63605								

Table 5: Constrains to the adoption of ICT.

Response	X	Mean	SD	t-test value	Decision
Yes	100	81.40	17.52	7.2	S
No	100	18.60			

not significant result of the t-test (-9.23). The high level of smart phone may be due to the popularity of GSM that was introduced to Nigeria in 2001. Television and radio are surprising because they are old ICT that people are already used to. The other types of ICT are mostly used for teaching which may the reason for their non-availability in the study area while internet may be associated with its cost. From this result, it can be deduced that these devices (smart phones, wireless radio and television) are reliably the best and most trustworthy sources of agriculture information and innovation among smallholder farmers. This is in line with Njelekela and Sanga (2015) submission based on his findings from his study which revealed that the farmers received pertinent agricultural information and knowledge through radios, mobile phones and televisions.

From Table 4, five characteristics were identified for awareness and use of ICT in the study area viz transfer/receive money, buy agric input, accessing agric information, make call/send sms/internet and advertise agric products. The range of the indicators showed low level of awareness (88.00), moderate (87.00) and high (1.00); the mean result is not different: (low-66.8000, moderate-32.4000 and 0.8000-high). The result of the chi square (87.0), which is significant is also a pointer to the fact that the level of awareness is low which supports the findings of Kalungu and Filho (2016) who opined that knowledge is positively and significantly related to the advantages of employing ICT to produce high yields and boost productivity. This outcome may be connected to the inadequacy of extension agents as noted in the literature of Okeke et al., (2015), Akinnagbe and Olaolu 2016) emphasizing on the inadequate support that given by the government for extension services. Farmers will not adopt any innovation that they don't have its knowledge which brings about the importance of extension agents and call for the attention of Government to employ more extension staff, give adequate training and equip them effectively.

Table 3 shows the high mean value 87.81 for those that do not use ICT and 33.20 for others and the not significant t-test value of -1.83 is an indication that majority of the farmers do not really use ICT for the aforementioned activities. In addition to awareness, cost may also be responsible for the low usage since it was indicted among the constraints. This supports the results that most farmers' poor use of ICT is due to a lack of financial resources to purchase smart phones, televisions, and radios (Lokeswari, 2016).

In (Table 5), the most noticeable restraints are cost (100%) and loan access (100%). Because of the exorbitant cost and difficulty in obtaining a loan to acquire them, ICT facilities are viewed as being primarily for the wealthy. Lack of training (73%), access to facilities (72%), and insufficient extension agents (62%) are all close behind. This shows the relationship between constraints and adoption which is supported by the result of the t-test (7.2) in line with the fact established by the United Nations (2018) in their submission that, constraints are the factors that prevented rural communities in the developing countries from accessing quality agricultural information and on time.

However, these can be seen as failure on the on the part of the Government because the solution to the constraints are all under its purview as opined by Ajayi (2014) that with adequate technical supports and resources, developing nations' smallholder farmers would use new innovations.

Conclusion and recommendations

The study revealed farmers with average education, reasonable family size which cut across almost age brackets. The farmers though exposed to smart phone, use it more for phone calls instead for agricultural business purposes. Lack of access to ICT facilities, inadequate extension agents, lack of training, high cost and lack of access to loan facilities were identified as constraints to the awareness, usage and adoption of ICT. Therefore, Government should create more awareness of ICT most especially at the rural communities where the larger population of farmers resides. Liberalize the ICT sector to make it affordable and accessible most especially for the smallholder farmers. More agricultural extension workers should be employed, adequately trained and financially mobilized for the purpose of effective and efficient service delivery.

REFERENCES

Adangara, U. M., Sennuga S. O., Ezinne, E. M., Barnabas, T. M. and Alabuja, F. O. (2022). Effect of Information Sources on Farmers' adoption of Sawah Eco-Technology in Rice Production in Kwali Area Council – FCT, Nigeria, *Acta Scientific Agriculture*, 6 (7), 03-09

Ajayi, O.J. (2014). Impact of the Anambra State Fadama Project Phase - 1 on the Socio-economic Life of the Rural Farmers, *Journal of Human Ecology*, 29, 123-140

Akinnagbe, O.M. and Olaolu, M.O. (2016). 'Policy issues for improving monitoring and evaluation of agricultural extension programmes in Nigeria', *African Evaluation Journal*, 3(2), 122-134.

Alfa, M. K., Sennuga S. O, Barnabas, T. M., Alabuja, F. O. &Ebhohon, A. (2022). Effects of Information and Communication Technology on Youths Participation in Sesame Seed Production in Kwali Area Council, Abuja, Nigeria, *Journal of Media & Management*, 169 4(04), 1-6

Annor-Frempong, F., Kwarteng, J., Agunga, R.and Zinnah, M.M. (2015). Challenges and prospects of infusing information Communication technologies (ICTs) in extension for Agricultural and rural development in Ghana, AIAEE 22nd Annual Conference Proceedings Clearwater Beach, Florida.

Chikaire, J.U., Anyoha, N.O., Anaeto, F.C. and Orusha, J.O. (2017). Effects of Use of Information and Communication Technologies (ICTs) on Farmers' Agricultural Practices and Welfare in Orlu Agricultural Zone of Imo State, Nigeria. *International Journal of Research in Agriculture and Forestry,* 4(3), 6-15.

Conger, S. (2015). Knowledge Management for Information and Communications Technologies for Development Programs in South Africa, *Information Technology for Development*, 21(1), 113-134.

Daum T. (2020). ICT applications in Agriculture. Hans Ruthenberg-Institute of Agricultural Science in the Tropics. University of Hohenheim, Stuttgart, Germany.

Francis, K.A.B. (2016). Organizational Information and Communication Technologies for Development, *Information Technology for Development*, 22(2), 193-204.

Gayi, S. and Tsowou, K. (2016). Cocoa industry: Integrating small farmers into the global value chain. New York and Geneva. (UNCTAD Research Report).

Irungu, K.R.G., Mbugua, D. and Muia, J. (2015). Information and Communication Technologies (ICTs) Attract Youth into Profitable Agriculture in Kenya, *East African Agricultural and Forestry Journal,* 81(1), 24-33.

Kalungu, J.W. and Filho, W.L. (2016). Adoption of appropriate technologies among smallholder farmers in Kenya, *Climate and Development*, 2(5), 1-13

Lai-Solarin, W. I., Adeoye, W. A., & Sennuga, S. O.(2022). Technology Adoption Capabilities of Small Farm Dairy Cattle Holders in Gwagwalada, Abuja: Effects of Asymmetric Information and Extension Approaches, *International Journal of Agricultural Economics*. 6 (2): 315-323

Lokeswari, K. (2016). A Study of the Use of ICT among Rural Farmers Coimbatore, India. *International Journal of Communication Research,* 6 (3) 232-238

Mwangi, M. and Kariuki, S. (2015). Factors Determining Adoption of New Agricultural Technology by Smallholder Farmers in Developing Countries, *Journal of Economics and Sustainable Development,* 6(5), 208-216.

Njelekela, C. and Sanga, C. (2015). Contribution Information and Communication Technology in Improving Access to Market Information among Smallholder Farmers: The case study of Kilosa District, *International Journal of Management Science and Information Technology* 17(2), 56-66.

Nwali P. N., Sennuga S. O & Emeka, O. (2022). Evaluation of Small-scale Women Farmers' Utilization of ICT in Accessing Agricultural Information in Gwagwalada Area Council, Abuja, Nigeria., *Green Reports*, 3(7): 34-38

O'Dea, S. (2020). Smartphone users worldwide 2016-2021. Statista online publication. Available at: https://www.statista.com/statistics/330695/number-ofsmartphone-users-worldwide

Okeke M. N., Nwlieji H. U. and Uzuegbunam C. O. (2015). Emerging Role of Information Communication Technologies in Extension Service Delivery in Nigeria: A Review. *Journal of Agricultural Extension*. 19(1), 25-38

Olorunniyi A. A., Ezinne M. E., Osiboye, O. O. &Sennuga S. O. (2022). Effect of social media in Enhancing Agricultural Extension among Farmers in Gwagwalada Area Council, Abuja, *Journal of Research in Science and Technology*, 3(4), 24-32.

Sennuga, S. O., Fadiji, T. O. and Thaddeus, H. (2020a). Factors Influencing Adoption of Improved Agricultural Technologies (IATs) among Smallholder Farmers in Kaduna State, Nigeria, *International Journal of Agricultural Education and Extension*, 6(2), 382-391.

Sennuga, S.O. (2019). Use of ICT among Smallholder Farmers and Extension Workers and its Relevance to Sustainable Agricultural Practices in, A Thesis submitted for the degree of Doctor of Philosophy (PhD), Coventry University, United Kingdom.

Sennuga, S.O., Baines, R.N., Conway, J.S. and Rhiannon, K.N. (2020b). Role of Information and Communication Technologies (ICTs) in Enhancing Food Utilization among Smallholder Farmers' Households in Northern Nigeria, *Information and Knowledge Management,*10(6), 24-32.