



**ASSESSMENT OF FACTORS INFLUENCING THE USE OF INFORMATION
AND COMMUNICATION TECHNOLOGIES BY SMALL-SCALE FARMERS IN
FEDERAL CAPITAL TERRITORY (FCT), ABUJA, NIGERIA**

H.U. Muhammad¹, G.B. Adesiji², I.S. Tyabo¹, Y. Muhammed¹ and A.I. Loko³

¹Department of Agricultural Economics and Extension Technology, Federal University of Technology, Minna

²Department of Agricultural Extension and Rural Development, University of Ilorin, Ilorin, Kwara State, Nigeria

³College of Agriculture, Mokwa, Niger State, Nigeria

ABSTRACT

This study was conducted to assess factors that influenced the use of ICT by small-scale farmers in FCT Abuja. Three-stage sampling procedure was adopted to select 80 small-scale farmers in which structured questionnaire was administered on to collect primary data. Data collected were analysed using descriptive statistics and logit regression model. The results revealed that most (90.0%) of the farmers were married and 55.0% had just primary school education. About 32.5% of respondents were within age range of 31–40 years with mean age of 34 years. Furthermore, 90.0% of the farmers had household size of 6–10 people with a mean of 7 people, while 57.5% of them had 6–10 years of farming experience with mean of 7.5 years. Half (50.0%) of respondents had farm size of 1.1–2.0 hectares with mean of 1.73 hectares, while 52.5% of the farmers had annual income between ₦41,000–₦60,000. Majority (87.5%) of the respondents were into maize production and about 37.5% of them use mobile phone. Result of logit regression revealed marital status and educational level of the farmers had positive and significant ($P < 0.1$) relationship with ICT use, household size had a positive and significant ($P < 0.01$) influence on ICT use, while credit access and extension contact had positive and significant ($P < 0.05$) influence on ICT use. Constraints identified include poverty among the farmers (97.5%), inadequate capacity and affordability, as well as poor access to ICT infrastructure (96.3%) ranked 1st and 2nd, respectively. ICT use was found to be influenced by socio-economic factors of the respondents. It is therefore recommended that, small-scale farmers should be sensitized and encouraged by extension agents to key into pro-poor programmes that will make them have access to ICT tools.

Keywords: ICTs; small-scale farmers; use

INTRODUCTION

Agriculture is one of the major sectors of Nigeria economy, with crop, fishery and livestock production sub-sectors forming its integral part. Crop, fishery and livestock

production contribute immensely to the livelihood of both rural and urban dwellers through increased food production, farm energy, manure, transportation, fuel, income and nutrition security (Jonadab, 2015). In Nigeria small-scale farmers form the bulk of farming community and that for agriculture to really develop, the small scale farmers need to know and understand what constitute progresses in agriculture. The extent of the farmers' progress hinged largely upon their access to accurate and reliable information of improved technologies. Dissemination of farm information can be said to be as critical as the development itself (Ajayi *et al.*, 2016). Any technology no matter how promising, if it does not reach the farmer can be perceived useless by the farmer. Information is considered as a resource that must be required and use by individuals in order to make informed decision (Muhammed *et al.*, 2018). It is obvious that individuals that receive appropriate and timely information will make better decision.

However, agricultural sector like any other sectors is information intensive and Information and Communication Technologies (ICT) play a very vital role in facilitating information exchange among people. That is ICT provides a platform for increased amount of information that can be transmitted to all participants in the agricultural sector as well as decrease the cost of dissemination of information (Ali *et al.*, 2015). It is generally believed that increased information flow has positive effect on farming operations (Adamides *et al.*, 2013). In this respect, farmers who are the major players of agricultural production, their ability to use improved production technologies is one of the important roles of ICT in agriculture (Nwagwu and Opeyemi, 2015).

Michel and Vancrowder (2001) perceives ICT as a range of electronic technologies that assist in information processing, storage, retrieval and transmission. Also, Torero and Brawn (2005) explained ICT to be veritable tools with which a network of interaction can be stimulated among individuals such that they overcome the physical barriers of distance and social standing to be part of integrated global knowledge system. However, Arokoyo (2005) identified some commonly used ICT tools in agriculture to include, radio, television, telephone (fixed and mobile), the web search engines, packet digital assistants, cameras, video e-mail, computer, contact data base and systems others are CD ROM, DVD, group wave, rural radio and web publishing. In other words, ICT comprise much more than just these media. The importance of ICT in agricultural production can therefore not be over emphasized, ICT assist in improving agricultural productivity through information sharing. It helps farmers to improve the amount and quality of information either indirectly through producers, associations, extension agents or directly through broad cast radio information, mobile phone messages and the rest (Ogbonna and Agwu, 2013). Other essential roles ICT play in enhancing agricultural production include, transfer of technology as well as sharing of modern agricultural practices among the farmers and change agencies, it also assist to improve the links between farmers, traders and create opportunities for small scale farmers to identify new markets thereby increasing their income and hence help to reduce poverty among people (Jain *et al.*, 2010; Nwagwu and Opeyemi, 2015).

By and large, the use of ICT in agriculture in Nigeria is still relatively new just like in other developing countries (Nwagwu and Opeyemi, 2015). Nevertheless, there is some evidence of ICT use at individual levels and also initiatives at organizational levels. It is however uncertain whether the small-scale farmers actually use the ICT facilities to achieve their goals. The major challenges in the use of ICTs in rural areas could be tied to socio economic and non-socioeconomic factors. The immense benefits of ICT to farmers and farm processes necessitate the understanding of factors that might influence the use of these

technologies by farmers. Similar studies exist (Bayes, 2001; Dao, 2004; Jonadab, 2015), but a study of this nature is still sketchy in FCT where large number of small-scale farmers operate particularly in area development councils. This study objective were to: describe the socio economic characteristics of the farmers; identify various crops grown by the farmers; examine the types of ICT tools used by the farmers; determine the factors that influence ICT use by the farmers, and identify the constraints hindering use of ICT by farmers in the study area.

MATERIALS AND METHODS

Study Area

This study was conducted in Federal Capital Territory (FCT) Abuja which lies between latitudes 8°25' and 9°25' N, and longitudes 6°45' and 7°45' E (Federal Capital Territory Agricultural Development Project (FCTADP), 2016). FCT administration is through Area Councils which function in the same way as Local Government Areas (LGA) of States with six (6) Area Councils namely Abuja, Abaji, Bwari, Gwagwalada, Kuje and Kwali. FCT has a population of 776,298 with an estimated land area of 7.315km² (National Population Commission (NPC), 2006). The projected population as at 2018 using 2.9% growth rate (World Bank, 2018) was 1,093,959. FCT is located in the Guinea Savannah vegetation with minimum and maximum temperature of 28°C – 33°C, respectively. The annual rainfall varies from 1100mm – 1600m, while agriculture is the dominant occupation of the people (FCTADP, 2016).

Sampling Procedure and Sample Size

Three-stage sampling technique was used to select the respondents. First stage involved purposive selection of two Area Councils noted for agricultural production out of six Area Councils. Second stage was random selection of four (4) villages from each of the selected Area Councils to get eight (8) villages, while the third stage was random selection of five (5) farmers from each of the selected villages to get a total sample size of 80 respondents.

Data Collection and Analysis

Primary data were used for the study and it was collected using structured questionnaire complemented with an interview schedule. Data collected were analysed using descriptive (frequency count, percentages and mean) and inferential (Logit regression model) statistics.

Logit Regression Model

Logit regression model was used to determine the factors influencing ICT use by the small-scale farmers in the study area as used by Muhammed *et al.* (2018). The implicit form of the Logit model is specified as:

$$Y = f(X_1, X_2, X_3, X_4, X_6, X_7, X_8, X_9, X_{10})$$

The Logit model in its explicit form is expressed as:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + e$$

Where;

Y = ICT use by the small-scale farmers (measured as dummy: 1 if farmers use ICT, 0 if otherwise)

X₁ = Age (years)

X₂ = Sex (male = 1, female = 0)

X₃ = Marital status (married = 1, otherwise = 0)

X₄ = Household size (number)

X₅ = Education (years)

X₆ = Income (naira)

X₇ = Access to credit (access = 1, otherwise = 0)

X₈ = Extension contact (number)

X₉ = Occupation (number)

X₁₀ = Distance to farm (kilometres)

β_0 = constant

$\beta_1 - \beta_{10}$ = coefficients of the independent variables

X₁ - X₁₀ = independent variables

RESULTS AND DISCUSSION

Socio Economic Characteristics of Respondents

Marital status: Results in Table 1 showed that majority (90.0%) of the farmers were married, 7.5% and 2.5% were single and divorced, respectively. This implies that in rural areas marriage is held with high esteem as no adult will be considered responsible if unmarried. This is in line with the findings of Yekini and Ajayi (2011) who posited that, marriage is held as a very serious institution particularly in rural areas and no adult is deemed responsible without it.

Educational status: Table 1 further revealed that 55.0% of the farmers had primary education, 12.5% had secondary education, 7.5% had tertiary education and 25.0% had no formal education. This implies that high proportion of the farmers could read and write, therefore, there is high tendency for them to use ICT to improve their farming practices in the area. This is because an educated farmer will find it easier to understand and use new technologies and information transmitted through ICT. This finding agrees with that of Ozor (2007) who reported that illiterates are disadvantaged and lack the basic skills required to rip the benefits of ICT.

Age: The result in Table 1 also shows that a proportion (32.5%) of the farmers were within age range of 31 – 40 years and just about 12.5% of them were above 50 years with mean age of 34 years. This implies that the farmers were basically youths or young adults that were still active to undertake farming activities. This reveals that this group of people can easily learn and use ICT in farming to source information regarding their farming activities. This finding agrees with the work of Ajayi *et al.* (2016) who reported that most of

Assessment of factors influencing the use of ICT

the respondents in their study area were young and active in farming, thus could easily utilize ICT.

Table 1: Socio-economic characteristics of the respondents (n = 80)

Variables	Frequency	Percentages	Mean
Age (Years)			
< 21	4	5.0	
21 – 30	20	25.0	
31 – 40	26	32.5	
41 – 50	20	25.0	
> 50	10	12.5	34
Marital Status			
Single	6	7.5	
Married	72	90.0	
Divorced	2	2.5	
Household Size			
1 – 5	6	7.5	
6 – 10	72	90.0	
11 – 15	2	2.5	7
Experience (Years)			
1 – 5	6	7.5	
6 – 10	46	57.5	
11 – 15	24	30.0	
> 15	4	5.0	7.5
Educational Status			
No Formal	20	25.0	
Primary	44	55.0	
Secondary	10	12.5	
Tertiary	6	7.5	
Farm Size (Hectare)			
< 1.1	20	25.0	1.73
1.1 – 2.0	40	50.0	
2.0 – 3.0	12	15.0	
> 3.0	8	10.0	
Income (₦)			
₦21,000 – ₦40,000	6	7.5	₦42,000
₦41,000 – ₦60,000	42	52.5	
₦61,000 – ₦80,000	18	22.5	
₦81,000 – ₦100,000	10	12.5	
> ₦100,000	4	5.0	

Source: Field Survey, 2016

Household size: The results in Table 1 revealed that majority (90.0%) of the farmers has household size of between 6 – 10 people, 7.5% and 2.5% has household size of 1 – 5 people and 11 – 15 people, respectively with mean of 7 people. This implies relatively large household size which serve as source of family labour that could help to reduce cost of

production. This agrees with the finding of Ojo *et al.* (2010) who reported that in any agrarian settlement, a large family size permits free and cheap labour.

Farming experience: Table 1 revealed that more than half (57.5%) of the farmers has 6 – 10 years of farming experience, 30.0% had 11 – 15 years of experience, 7.5% had 1 – 5 years of experience and 5.0% had above 15 years of farming experience with a mean of 7.5 years. This implies that, majority of the farmers in the study area has been into farming for a relatively long period of time. This finding agrees with the work of Ajayi *et al.* (2016) who reported that their respondents had being into agricultural production for relatively long time.

Farm size: The results in Table 1 further showed that half (50.0%) of the farmers had farm size of 1.1- 2.0 hectares 25.0% had farm size below 1.0 hectare, while 15.0% had farm size between 2.1 – 3.0 hectares and 10.0% had above 3.0 hectares with mean farm size of 1.73 hectares. This implies that the farmers in the study area were actually small-scale farmers. This finding is in line with the work of Suleiman (2017) who reported that his respondents are smallholder farmers operating at subsistence level which could affect their usage of ICTs.

Income: Table 1 revealed that more than half (52.5%) of the farmers had monthly income between the range of ₦41,000-₦60,000, 22.5% had monthly income between the range of ₦61,000-₦80,000 and 12.5% had monthly income between the range of ₦81,000-₦100,000 with a mean monthly income of ₦42,000. This implies that the farmers in the study area were low income earners which could influence their ICT utilization negatively. This finding is in agreement with the work of Loko *et al.* (2017) who reported that most of the respondents in their study area are low income earners.

Crops Grown by the Respondents

Result in Table 2 showed that majority (87.5%) of the farmers were engaged in maize production and this ranked 1st as major crop cultivated, while yam and sorghum ranked 3rd and 4th, respectively. Rice ranks 5th as major crop grown by the farmers, while cowpea (12.5%) and vegetables (12.5%) ranked 6th respectively. This implies that, high proportion of the farmers in the study area were engaged in production of major staple food crops and hence their use of ICT to seek for improved farming techniques can go a long way to boost their farming activities as well as improve their standard of living. This finding is in line with the work of Ibrahim and Onuk (2010) who reported that majority of the respondents in their study area are into staple food crop production such as sorghum, millet, melon, yam, soybean cassava and rice.

Table 2: Major crops grown by the respondents (n = 80)

Crops	Frequency*	Percentage	Rank
Cassava	59	73.8	2 nd
Rice	30	37.5	5 th
Yam	56	70.0	3 rd
Maize	70	87.5	1 st
Sorghum	36	45.0	4 th
Cowpea	10	12.5	6 th
Vegetables	10	12.5	6 th

Source: Field Survey, 2016

*Multiple Response

Types of ICT Tools Used by the Respondents

Results in Table 3 revealed that 37.5% of the farmers use mobile phone to source farming information, followed by 30.0% of the farmers who use radio and 12.5% who use television to source for farming information. Other ICT tools use by the farmers to source agricultural information includes laptop (10.0%), computer (7.5%) and internet (2.5%). This implies that mobile phone and radio were the major ICT tools used by the farmers in the study area which could be due to the fact that they are readily available, ease to move with and cheap to access particularly radio. This finding is in line with Muhammed *et al.* (2018) who reported that mobile phones and radio are the commonly used ICT tools to source for information by farmers.

Table 3: ICT tools used by the respondents

ICT Tools	Frequency	Percentage
Radio	24	30.0
Television	10	12.5
Mobile phone	30	37.5
Computer	6	7.5
Internet	2	2.5
Laptop	8	10.0
Total	80	100.0

Source: Field Survey, 2016

Factors Influencing ICT Use by the Respondents

Table 4 revealed the results of logit regression of factors that influence the use of ICT by small scale farmers in FCT.

Table 4: Regression coefficients of factors influencing use of ICT tools

Variables	Coefficients	Standard Error	t – value
Constant	-9.265	4.359	-2.125**
Age (X ₁)	-0.046	0.078	-0.591
Gender (X ₂)	1.539	1.792	0.859
Marital status (X ₃)	2.507	1.268	1.977**
Household size (X ₄)	0.626	0.250	2.499***
Education (X ₅)	0.336	0.177	1.902*
Income (X ₆)	-0.154	0.216	-0.712
Credit access (X ₇)	4.969	2.050	2.423**
Extension contact (X ₈)	1.924	0.818	2.352**
Occupation (X ₉)	1.660	1.836	0.904
Distance to the farm (X ₁₀)	0.130	0.737	0.177
Chi-squared = 23.46***			
Pseudo R ² = 0.4433			
Log likelihood = 61.3132			

Source: Field Survey, 2016 *significant at 10%, **significant at 5%, ***significant at 1%

Among the variables, marital status and educational level revealed positive relationship and significantly influenced ICT use ($P < 0.10$). Education increases the awareness, access and use of ICT by farmers. This implies that the more educated farmers are the more likely they utilize ICT to seek for agricultural information and hence increase productivity. On the other hand, married farmers have family responsibilities and this influence their decision making process, level of experience and use of ICT. This is in line with the finding of Kwapong (2005) who reported that married individuals are more likely to be stimulate by income effect to acquire information through ICT. Also, household size has positive relationship and significantly influence farmers' use of ICT ($P < 0.01$), while credit access and extension contact have positive relationship and significantly influence farmers' use of ICT ($P < 0.05$). Large household size provides cheap source of labour for the farmers and this encourage farmers to seek for improved production information in order to increase productivity. More so, the more farmer has access to credit, the more his capability to acquire ICT to access agricultural information. This implies that farmers that has access to credit stand a better chance to use ICT in order to boost agricultural production.

Constraints Hindering the Use of ICT by the Respondents

The constraints to the use of ICTs by small-scale farmers in the study area are presented in Table 5 which include poverty (97.5%) ranked 1st, followed by inadequate capacity and affordability (96.3%) and poor access to ICT infrastructure (96.3%) ranked 2nd. Other constraints were poor financial support (95.0%), erratic power supply (93.4%), poor network coverage (92.5%), language barrier (90.0%) and low illiteracy level (86.3%). These constraints had negative implication on ICT utilization by small-scale farmers to boost agricultural production in the study area. This is in line with Muhammed *et al.* (2018) reported that unavailability of ICT tools, poor knowledge skills and high cost of purchase were the constraints associated with ICT utilization in their study area.

Table 5: Constraints Faced by the Respondents in Using ICT Tools

Crops	Frequency*	Percentage	Rank
Inadequate capacity and affordability	77	96.3	2 nd
Poor network coverage	74	92.5	6 th
Erratic power supply	75	93.4	5 th
Poor access to ICT infrastructure	77	96.3	2 nd
Illiteracy	69	86.3	8 th
Poverty	78	97.5	1 st
Language barrier	72	90.0	7 th
Poor financial support	76	95.0	4 th

Source: Field Survey, 2016

*Multiple Response

CONCLUSION

Based on the findings emanating from this study, it was concluded that majority of the respondents were young and in their active age where they could utilize ICT to source for agricultural information especially information on food crops they produce. Mobile phones and radio were the major ICT tools use by the farmers to source information, while marital status, educational level, household size, credit access and extension contact influence the

use of ICT. Constraints such as poverty among the farmers, inadequate capacity and affordability of ICT tools as well as poor access to ICT infrastructures were identified to hinder the use of ICT by the small-scale farmers in the study area.

It was therefore recommended that, small-scale farmers should be sensitized and encouraged by extension agents to key into poverty alleviation programmes that will help them have access to ICT tools. Relevant stakeholders in the ICT sector should ensure the development of ICT infrastructure, while capacity building be extended to the small-scale farmers. ICT tools should be subsidized to the level that small-scale farmers can afford.

REFERENCES

- Adamides, G., Stylianous, A., Kosmos, P. C. & Apostoloulos, C. D. (2013). Factors affecting PC and internet usage by the rural population of Cyprus. *Agricultural Economics Review*, 14 (1), 67 – 83.
- Ajayi, O. J., Muhammed, Y., Olah, F. and Tsado, J. H. (2016). Effect of Information and Communication Technology (ICT) usage on cassava production in Otukpo Local Government Area of Benue State, Nigeria. *Production Agriculture and Technology Journal*, 12 (2), 49 – 58.
- Ali, V., Niusha, E. and Akram, B. (2015). Factors affecting ICT adoption in rural area: A case study of rural users in Iran. *Research Journal of Fisheries and Hydrobiology*, 10 (10), 611 – 616.
- Arokoyo, T. (2005). ICTs application in agricultural extension services delivery. *Journal of Agricultural Extension*, 6, 245 – 250.
- Bayes, A. (2001). Infrastructural and rural development: insight from a Grameen Bank Village phone initiative in Bangladesh. *Agricultural Economics Review*, 25, 261 – 270.
- Dao, M. Q. (2004). Rural poverty in developing countries: an empirical analysis. *Journal of Economic Studies*, 31 (6), 500 – 503.
- Federal Capital Territory Agricultural Development Project (FCTADP) (2016). National Farmers Data Base, Federal Capital Territory (FCT), Abuja, Nigeria.
- Ibrahim, H. Y. and Onuk, E. G. (2010). The impact of Root and Tuber Expansion Programme (RTEP) on roots and tuber crops production in Nasarawa State, Nigeria. *Production Agriculture and Technology*, 6 (2), 26 – 34.
- Jain, R. Alka, A. and Usha, A. (2010). Clustering approach to diagnose determinants of ICT empowerment to women farmers. In: Amstrong, I. J. and J. Clayden (eds). Proceeding of the knowledge Discovery for Rural Systems Workshop 2010 at the 14th Pacific-Asia conference on knowledge Discovery and Data Mining, IIIT Hyderabad. Hyderabad India. 21st-24th June.
- Jonadab, U. C. (2015). Analysis of Information and Communication Technology roles in Poverty Reduction among Small and Medium Scale Farmers in Imo state, Nigeria. *Library Philosophy and practice (e-journal)*.
- Kwapong, O. A. (2005). The Use of ICTs for Empowerment of Rural Women in Ghana. Doctoral Dissertation, University of Ghana, Accra.
- Loko, A. I., Olaleye, R.S., Umar, I. S., Muhammed, Y. and Muhammad, H. U. (2017). Income generation of youths from agricultural and non-agricultural activities in Niger State, Nigeria. *Nigerian Journal of Agriculture, Food and Environment*, 13 (3), 46 – 51.

- Michel, S. L. and Van Crowder, I. (2001). *Discovering the magic Box, Local Appropriation of Information and Communication Technology (ICTs)* SDRE, FAO Rome.
- Muhammed, Y., Usman, R. K., Ajayi, O. J., Muhammad, H. U., Loko, A. I. and Tijani, S. A. (2018). Analysis of Information and Communication Technology (ICT) Usage in Marketing of Poultry Production in Chikun Local Government Area, Kaduna State, Nigeria. *Savanna Journal of the Environmental and Social Sciences*, 4, 413 – 420.
- National Population Commission (NPC) (2006). *The Population and housing census of Nigeria*, Abuja, Nigeria.
- Nwagwu, W. E. and Opeyemi, S. (2015). ICT use in livestock innovation chain in Ibadan city in Nigeria. *Advances in Life Science and Technology*, 32, 21 – 30.
- Ogbonna, O. I. and Agwu, A. E. (2013). Availability, level of use, importance and constraints to utilization of information communication technologies by farmers in Enugu state, Nigeria. *Journal of Agriculture and food science*, 1 (4), 44 – 46.
- Ojo, M. A., Osadumo, D., Olaleye, R. S., Ojo, A. O., Tsado, J. H. and Ogaji, A. (2010). Perceived relevance of improved rice production technologies in Katcha Local Government Area of Niger State, Nigeria. *Nigeria Journal of Rural Sociology*, 11 (2), 58 – 63.
- Ozar, N. (2007). Challenges to effective use of information and communication technologies (ICTs) in the delivery of agricultural extension services. *Journal of Agricultural Extension* Vol. 10: 40-44.
- Suleiman, I. (2017). *Assessing the Perceived Effects of Information and Communication Technologies among Rice Farmers in Niger State, Nigeria*. An unpublished MTECH Thesis submitted to the Department of Agricultural Economics and Extension Technology, Federal University of Technology, Minna, Niger State, pp 1 – 78.
- Torero, M. and J.C Von Brown (2005). *Information and Communication Technologies (ICTs) for the poor-* Washington D.C 6PP.
- World Bank (2018). Rural population (% of total population). Available at <http://data.worldbank.org/indicator> accessed on July 9, 2018.
- Yekini, O. T. and Ajayi, O. E. (2011). Palm oil enterprise contribution to house hold welfare in Irewole Local Government Area of Osun State, Nigeria. *Journal of Rural Sociology*, 12 (1), 27 – 34.