

The Impact of ICT on the Productivity of Urban Farmers in Nigeria: The Case Study of Abuja, FCT, Nigeria

Moses Ubaru¹, Jemilat Ibrahim², Samuel Ubaru³

^{1,3}Department of Computer Science, Baze University, Abuja, Nigeria

²Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Idu Industrial Area, Abuja

Abstract: *The study investigated the extent to which farmers in Abuja, the Federal Capital Territory (FCT) of Nigeria, make use of ICT in their farm work by examining their level of ICT awareness and their level of access to ICT for agriculture. Primary data were collected by the researcher and trained enumerators, using a well-structured questionnaire and interview schedule which was administered to 170 respondents selected using multiple-stage random sampling technique. Both descriptive and inferential statistics were employed in the data analysis. The study revealed that the use of ICTs for agricultural activities in the study area is still at very low level due to low level of awareness and lack of ICT skills. Results obtained indicate that 55% of the respondents had at least secondary education, and 33% of the respondents fall within the age brackets of 26 – 35 years which indicates that there is a ready pool of youths that could be trained on the use of ICT for agriculture in the study area. Provision of infrastructural facilities, periodic training of farmers, subsidizing of ICT facilities as well as organizing public enlightenment programmes were recommended for the enhancement of the farmers' ICT awareness and their productive use of ICTs.*

Keywords: Information, Communication, Technologies, Farmers, Agriculture.

1. Introduction

Over the years Nigeria has depended mostly on sale of crude oil for her revenue. However, with the dwindling oil revenue in recent times, Nigeria is compelled to diversify. And agriculture promises to be a more reliable alternative as it remains the mainstay of the economy contributing the largest share of Gross Domestic Product (GDP). It is also the largest non-oil export earner, the largest employer of labour and a key contributor to wealth creation and poverty alleviation. Nigeria has a population of about 150 million people, and 70% of the workforce are engaged directly or indirectly in agricultural activities [1], [2]. Therefore, the Federal Government of Nigeria is determined to explore every possible avenue to boost the productivity of the farmers.

Most of the farmers live in rural areas and practice subsistence farming leading to poor productivity and poor living standards. The result of which is huge import bills for food and industrial raw materials, appalling incidence of poverty, rampant food insecurity and child malnutrition [3].

One sure way to help ward off hunger among low-income households may be through the farming of small plots of land available in urban environments or on the perimeter of the city. Such small scale farming in city environment often referred to as 'Urban Agriculture', helps in the provision of employment, enhances food supply, supplements the income and boost the nutrition of low-income households [4]. Therefore, the study of the impact of Information and

Communication Technology on urban farmers becomes very imperative.

2. Review of Related Literature

Some of the major problems facing agricultural productivity in Nigeria have been identified as illiteracy, lack of access to relevant information and slow adoption of modern farming techniques [5]. The level of literacy of farmers can negatively affect their ability to access and adopt modern and innovative farming techniques. On the other hand, it is also widely believed that the exploitation of appropriate Information and Communication Technologies (ICTs) can improve the literacy of farmers, thereby increasing their ability to access agricultural information, and enhance their ability to interpret and utilize the information to boost their productivity [6].

There is hardly any field of human endeavour today that has not benefitted from the dramatic developments that has taken place in ICT in the last 10-15 years. Agriculture and agriculture related businesses are no exception. ICT has become a powerful tool for improving service delivery and enhancing local development opportunities. Modern agricultural technology, coupled with ICT provides very powerful tools to local farming communities by transforming them into knowledge farmers [7].

Farmers generally, require information on supply of inputs, modern farming technologies, early warning of natural disasters, source of credit, market price, transport logistics and their competition. ICT can help to provide such information,

knowledge, technology and service thereby transforming the farmers to smart farmers[8].It has the potential to enable greater and faster interaction within different groups of people from different societies especially among farmers. Thereby leading to growing productivity, economic growth, facilitation of trade, reduced transport costs, access to funds, job creation and improved quality of life of the farmers[9], [10].

In Nigeria, the Federal Government in recognition of the importance of ICT in agricultural activities, established policies and projects in this regard; among which are;

ICT Market deregulation.

The liberalisation and privatisation policies of the Federal government of Nigeria is encouraging private sector participation and attraction of foreign investment which tends to reduce the price of computers and other ICT equipment, making them more accessible[11]. While deregulation in the telecommunications industry have given rise to competition among the licensed GSM operators which has led to significant decline in voice, data and internet tariffs.

Fertilizer GSM Initiative.

The Federal Government in 2012 introduced the Growth Enhancement Support Scheme (GES), which was designed to deliver government subsidised farm inputs directly to farmers via GSM phones. The GES scheme is powered by eWallet, an electronic distribution channel which provides an efficient and transparent system for the purchase and distribution of agricultural inputs based on a voucher system. The scheme guarantees registered farmers eWallet vouchers with which they can redeem fertilizers, seeds and other agricultural inputs from agro-dealers at half the cost, the other half being borne by the Federal Government and State Government in equal proportions[12].

NITDA IT Centers

The National Information Technology Development Agency (NITDA) in 2013 came up with the concept of Rural Internet Resource Centre (RITCs) with a pilot scheme deployed in Ten (10) Local Government Areas (LGA) across the country [13]. Today the RITCs which have been remodeled and renamed Public Access Venues (PAV) and Knowledge Access Venues (KAV) now exist in over 740 locations across the country. These centers were expected to facilitate universal access to information, enhance learning and research, through digital access to academic resources in educational institutions, increase digital penetration in the country, provide youth access to online digital content and provide a community based platform for e-services such as e-agriculture, e-government, e-commerce, telemedicine and so on.

As a result of cheap ICT equipment and reduced data and voice tariff, stakeholders across the agricultural fields can now easily tap into a wide range of mobile apps and digital solutions for the administration and management of agro-based businesses, and for the improvement of access to markets, inputs, extension services, etc. However, a previous study on the “Role of Mobile Phone Technology in Improving

Small Farm Productivity” [10] has shown that although, mobile phones can act as catalyst to improving farm productivity and rural incomes, the quality of information, timeliness of information and trustworthiness of information are three important aspects that have to be delivered to the farmers to meet their needs and expectations. And also most of the Nigerian farmers are illiterate and need to be guided, encouraged and educated on how to exploit the ICT in agriculture [8].

Many residents of urban areas like Abuja and the neighbouring communities are now engaging in farming to augment their income as a result of high cost of living in most urban centers. And this is also in line with the Federal government’s call for Nigerians to go back to the land as a way of reducing the nation’s over-dependence on oil. The potential benefits of ICT in agriculture have been well documented[10], [14] and its accompanying challenges to its effective use in agriculture especially in urban center like Abuja which have easy access to the ICT facilities (e.g Internet) were also identified. Therefore, the aim of the current study is to assess the ICT needs of the farmers in FCT, the level of ICT awareness of the farmers, the appropriate ICT solutions that could address the needs, factors that may encourage the farmers to use the solutions and the relationship between the socio-economic characteristics of the farmers and their access to ICT as a source of information on agricultural technology.

Objective of the study

The specific objectives of the study are therefore, to:

- 1) Describe the socio-demographic characteristics of the farmers in the study area
- 2) Determine the level of ICT awareness of the farmers
- 3) Determine the level of access to ICT as source of information on agricultural technology by the farmers ;
- 4) Determine the relationship between the socio-economic characteristics of the farmers and their level of ICT awareness and access to ICT as a source of information on agricultural technology; and
- 5) Determine the preferred ICT solutions and training needs of the farmers

H01: There is no significant relationship between the socio-economic characteristics of the farmers in the study area and their access to ICT as source of information on agricultural technology.

H02: There is no significant relationship between the socio-economic characteristics of the farmers in the study area and their level of access to ICT as source of information on agricultural technology.

3. Methodology

The study area comprises of Abuja city and some of its satellite towns. The satellite towns include: Lugbe, Kuje, Idu-Karmo, Bwari, Mpape, Nyanya, and Karu in Abuja, as well as adjoining town of Suleija and Chazain in Niger state. Abuja lies at

latitude 9.07N and longitude 7.48E, and at an elevation of 840 m (2760 ft) above sea-level. It is situated at the geographical center of Nigeria. The Abuja area has two distinct seasons: the rainy season that lasts from April to October with rainfall ranging from 305 to 762 mm (12–30 in.) and temperatures raising up to 40° C in May; and the dry season that lasts from November through March with dry winds lowering the temperature to as low as 12° C. However, within these seasons is a brief harmattan season that is occasioned by the north east trade wind and the attendant dust haze, increased cold and dryness. Weather conditions in Abuja are influenced by its location within the Niger-Benue trough on the windward side of the Jos Plateau and at the climate transition zone between the essentially 'humid' south and the 'sub-humid' north of the country. Because of its abundant rainfall, rich soil and the location within the Guinea-Savanna vegetation zone, the region is good for agriculture.

Study population, Data Collection and Analysis

One hundred and seventy (170) farmers were randomly selected from the six randomly selected groups of towns from the study area for the study. They were mostly crop farmers that grow variety of staple and vegetable crops such as yam, cassava, rice, maize, potatoes, groundnut, cocoyam, melon, tomatoes and Okro. Others were poultry, livestock, medicinal plants and fish farmers. Primary data used for the study were collected with the aid of well-structured questionnaires through oral interview schedules administered to the urban farmers by the researchers and trained enumerators. Prior Informed consent of the farmers were obtained before the questionnaires were administered. The enumerators noted the respondents' responses to each questions in the questionnaires. The questionnaires were administered with help of interpreters into the appropriate languages (e.g Hausa, Gwari) where respondents cannot communicate in English.

The level of awareness is the measure of whether the farmers know about and are familiar with the various ICT applications and services available. The farmers were asked of the ways they knew of, that ICT could be used to enhance their farm work and if they knew about ICT applications for agriculture. The farmers were asked to give their opinion on 10 specific roles of ICT, which were identified through discussion with different stakeholders before and during pre-testing of data collection instruments. With yes = 1 and no =0, the sum of their responses to the 10 specific roles of ICT was used as the measure of each farmer's level of awareness. [15].

The accessibility of the farmers to ICTs is computed as the degree to which an individual respondent is able to use ICTs or ICT applications for the purpose of agriculture and rural development. A scoring of 1 and 0 was given to the respondents accessing ICTs and not accessing ICTs respectively. The sum of their responses to access to the 6 specific types of ICT was then used as the measure of each farmer's level of ICT access.[15].

The data were analyzed using the statistical package for social science (SPSS). The objectives (i), (ii) and (iii) were analyzed using Descriptive statistics such as percentage, frequency table and mean. The objectives (iv) and (v) were analyzed by multiple regression while the objective (vi) was analyzed with likert scale technique.

4. Results and Discussions

4.1 Socio-demographic Characteristics of Sampled Farmers

The socio-demographic characteristics of the sampled farmer were presented in Table 1.

Table1: Percentage Distribution of Socio-economic Characteristics of Respondents

	Frequency	Percent
Education Attainment:		
No Education	34	20.0
Primary School	42	24.7
Secondary School	56	32.9
Post-Secondary	38	22.4
Age bracket:		
18-25 Years	10	5.9
26-35 Years	54	31.8
36-45 Years	62	36.5
46-55 Years	32	18.8
Above 55 Years	12	7.1
Household Size:		
1-5 members	83	48.8
6-10 members	63	37.1
11-20 members	20	11.8
Farming Experience:		
1-5 Years	32	18.8
6-10 Years	41	24.1
11-15 Years	33	19.4
16-20 Years	63	37.3
Type of Farming:		
Crop Production	145	85.3
Fish Farming	8	4.7
Poultry	7	4.1
Livestock	4	2.4
Medicinal Plants	6	3.5
Any other Occupation:		
No other job	71	41.8
Civil Servant	15	8.8
Security Officer	15	8.8
Driver	8	4.7
Carpenter	2	1.2
Other	39	22.9
Trading	20	11.8

Source: Field survey, 2017.

Majority (85.9%) of the respondents were male while 14.1percent were female (Table 1). This is the usual norm observed in Nigeria with majority of farmers being of male gender[12], [16], [17].

The table1 showed that majority (80%) were literate while (20%) were illiterate. 55.3 percent of the respondents had at

least secondary education. The high percentage of literate farmers observed in this study contradicts the known norm of farmers in Nigeria being majorly illiterates [8], [18]. This might be attributed to the fact that the study area is an urban settlement where majority of those involved in the farming activities has one form of a paid job or another (Table 1), and the farming is being undertaken to augment the salaries received from their regular job in order to cope with the high cost of living associated with the urban settlement of Abuja, a federal Capital of the Nigeria. However, going by [12], [19] which stated that educational status enhances efficiency of farmers, we can thus deduce that the farmers in Abuja have good level of formal education sufficient to understand and apply ICT for agriculture and can participate in new ideas and are likely to adopt new innovation.

Table 1 also indicates that the respondents in the age bracket 36 – 45 years were 36.5 percent, those in the age bracket of 26 - 35 years were 31.8%, while those less than 26 years were 10 percent. Thus the respondents that fell between 26 – 45 years was 68.3%. This implies that majority of the respondents were youths and can still actively participate in the use of ICT in agriculture. The call for youth to participate in farming are yielding results as previously the old and illiterates resident in the villages are those engaged in various farming activities [19]. This view confirms the findings of Williams [8] that young people participate more in ICT in agricultural technology.

The respondents' household sizes are 1 – 5 (48.8 percent) 6 – 10 members (37.1 percent) and 11 members and above (11.8 percent). The resultant mean household size of 6.34 suggests that there is ready pool of cheap and affordable farm labour for farming.

4.2 Type of farming and Involvement in other occupation:

About eighty-five percent of the respondents practiced crop farming, 4.7 percent practiced fish farming, 4.1 percent practiced poultry farming, 3.5 percent practice cultivate medicinal plants, while 2.4 percent of the respondents are involved in livestock. The fact that majority of the farmers are involved in crop production may support the notion that majority of urban farmers mainly added farming to their occupation to supplement their sources of livelihood. This also corroborate the observation from this study where only about 41% of the respondents being full time farmers while the rest have paid jobs (Table 1). 8.8% are civil servants, 11.8% are traders, 8.8% drivers and about 23% involved in other businesses not included in the survey tool.

4.3 Level of ICT Awareness and usage

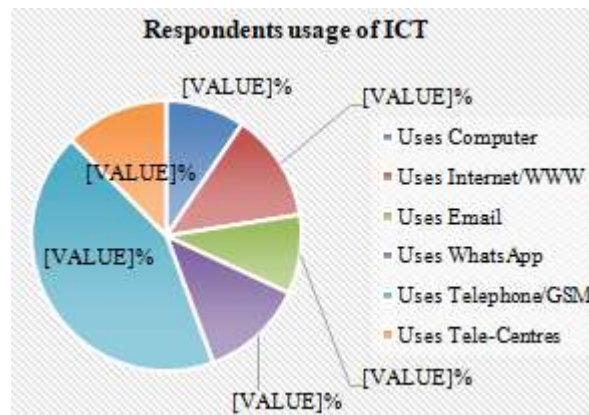


Figure 1: Farmers' ICT usage

Source: Field survey, 2017.

The high majority of the respondents of about 43% make use of GSM more than any other type of ICT facility (Fig. 1). Internet / WWW, WhatsApp and Tele-centres usage by the respondents were 13%, 12.4% and 12.4% respectively (Fig. 1). The respondents that use computers and those that use e-mail were 9.5% each. We may therefore deduce from the above facts that the most effective way to support the farmers with ICT in the study area should be through the use of relevant GSM based Apps. Only 30 percent of the respondents indicated that they make use of ICT for their farming activities.

Table 2: Level of Awareness of ICT Apps and services

Level of Awareness	Farmers		Mean	STD
	Number	Percent		
Low (0 – 3)	119	70	2.4529	2.28466
Medium (4 – 7)	46	27		
High (8 – 10)	5	3		

Source: Field survey, 2017.

In table 2, the farmers were classified into three categories on the basis of their awareness score. The awareness score of the farmers about available ICT applications and services for agriculture ranged from 0 to 10. The mean value was 2.4529 and standard deviation being 2.28466. Table 2 indicates that 70 percent of the farmers in the study area had very low awareness of the ICT applications and services available. Only 27 percent had moderate awareness. Similar study carried out in Ebonyi state also reported that even though numerous ICTs were available in the area, the respondents were not fully aware of them. [11].

4.4 Level of ICT Access

Table 3: Level of access of farmers to ICT

Level of Access	Farmers		Mean	STD
	Number	Percent		
Low (0 – 2)	150	88	.9941	1.60065
Medium (3 – 4)	8	5		
High (5 – 6)	12	7		

Source: Field survey, 2017.

Table 3 indicates the scores of the level of access of the farmers to ICT on a scale that ranged from 0 to 6. The mean value was .99 and standard deviation 1.60. Eighty-eight percent of the farmers in the study area had very low level of access to ICT applications and services (Table 4), 51% had no access to ICT while only 7% had high level of access to ICT. Finding here is similar to the result obtained in the study of the adoption of information and communication technology (ICT) in agriculture in Adamawa state, Nigeria[5].

4.5 Hindrances to farmers' adoption of ICT

Table 4: Hindrances to Farmers' adoption of ICT

		Responses	
		N	Percent
Hindrances to ICT Use ^a	Lack of ICT Knowledge	82	41.8%
	High Cost of ICT	39	19.9%
	No Interest in ICT	24	12.2%
	No ICT Facility	28	14.3%
	No Electricity	23	11.7%
Total		196	100.0%

Source: Field survey, 2017.

The farmers' perception on what hinder them from use of ICT despite its availability and awareness of its advantages was important to be able to propose possible solutions. Majority of the farmers, 42% indicated that lack of knowledge on how to use the ICT facilities hinder them from using it for their farm work while about 20% identified high cost of ICT as a hindrance to its adoption (Table 4).

4.6 Preferred ICT information by farmers

Table 5: Top ten information demanded by the farmers

Required Information	Percent
How and where to buy farm inputs	63.80%
Type of fertilizer to buy	36.60%
Current Market Values	36.20%
Type of Feeds to Buy	36.10%
Raining Pattern	35.40%
When to plant	33.00%
When to apply fertilizer	29.50%
Where to obtain fertilizer	29.20%
What to plant in particular season	28.20%
types of Herbicides and Pesticides	25.30%

Source: Field survey, 2017

Table 5, indicates the top ten types of information that are in high demand by the farmers in the study area. These represent the crucial information that any application developed for use by farmers in the study area must provide.

4.7 Relationship between the level of education of the farmers and their level of ICT awareness.

A Pearson correlation analysis was conducted to examine whether there is a relationship between the level of education of the farmers and their level of awareness. The results revealed a significant positive relationship between Education and the level of awareness of the farmers ($r = .387$, $N = 170$,

$\rho = 0.01$). The correlation was moderate in strength. Higher levels of education were associated with higher levels of awareness. (Table 6).

Table 6: Relationship between education and level of Awareness

Correlations			
		Education	Level of Awareness
Education	Pearson Correlation	1	.387**
	Sig. (2-tailed)		.000
	N	170	170
Level of Awareness	Pearson Correlation	.387**	1
	Sig. (2-tailed)	.000	
	N	170	170

** . Correlation is significant at the 0.01 level (2-tailed).

4.8 Relationship between the farming experience of the farmers and their level of ICT awareness

The results of Correlation analysis conducted to examine whether there is a relationship between the farming experience of the farmers and their level of awareness, revealed a significant positive relationship between farming experience and the level of awareness of the farmers ($r = .165$, $N = 169$, $\rho < 0.05$). (Table 7).

Table 7: Relationship between the farmer's farming experience and their level of ICT awareness

Correlations			
		Level of awareness	Farming Experience
Law	Pearson Correlation	1	.165*
	Sig. (2-tailed)		.032
	N	170	169
Farming Experience	Pearson Correlation	.165*	1
	Sig. (2-tailed)	.032	
	N	169	169

Higher farming experience was associated with higher level of awareness of ICT for agriculture (Table 7).

4.9 Relationship between gender of famers and ICT level of awareness

Pearson correlation analysis revealed that there is no significant relationship between gender of the farmers and the level of awareness of the farmers ($r = -.026$, $N = 170$, $\rho = 0.732$ (Table 8).

Table 8: Relationship between gender of famers and ICT level of awareness

Correlations			
		Level of awareness	Gender
Law	Pearson Correlation	1	-.026
	Sig. (2-tailed)		.732
	N	170	170
Gender	Pearson Correlation	-.026	1
	Sig. (2-tailed)	.732	
	N	170	170

4.10 Relationship between the education of the farmers and their level of access to ICT for agriculture

Pearson correlation analysis conducted to examine whether there is a relationship between the education of the farmers and their level of ICT access revealed that there is no significant relationship between education and the level of access to ICT by the farmers in the study area ($r = .140$, $N = 170$, $\rho = 0.069$) (Table 9).

Table 9: Relationship between education and level of Access to ICT

Correlations			
		Level of Access	Education
Lac	Pearson Correlation	1	.140
	Sig. (2-tailed)		.069
	N	170	170
Education	Pearson Correlation	.140	1
	Sig. (2-tailed)	.069	
	N	170	170

4.11 Relationship between the level of ICT access and farming experience

The Analysis of the relationship between the farming experience of the farmers and their level of ICT access indicated that there is no significant relationship between the two in the study area ($r = -.010$, $N = 169$, $\rho = 0.90$) (Table 10).

Table 10: Relationship between level of ICT Access and farming experience

Correlation			
		Level of access	Farming Experience
Lac	Pearson Correlation	1	-0.01
	Sig. (2-tailed)		0.9
	N	170	169
Farming Experience	Pearson Correlation	-0.01	1
	Sig. (2-tailed)	0.9	
	N	169	169

5. Conclusion and Recommendations

The study of the impact of ICT on the productive use of ICT by the farmers in Abuja has been carried out. The study reveals that only about 9% of the respondent farmers are civil servant and most of the farmers are involved in subsistence farming. Majority of the farmers (51%) do not have access to ICT for their farm work. The study identifies lack of appropriate ICT skills as one of the major hindrances to the adoption of ICT for farming in the study area. This is closely followed by high cost of ICT facilities. This is one area that need intervention of relevant and appropriate agencies in Nigeria to provide training to the farmers on ICT for agriculture development. It is therefore recommended that periodic training of farmers, subsidizing ICTs facilities as well as organizing public enlightenment programmes should be carried out to improve the awareness and the use of ICTs.

Also, one possible way to encourage adoption of ICT for farming in the study area is to develop relevant GSM based mobile Apps for the farmers since GSM is the most accessible ICT facility to the farmers.

References

- [1] O. O. Fasina, "Farmers Perception of the Effect of Aging on their Agricultural Activities in Ondo State, Nigeria," *Belogradchik J. Local Hist. Cult. Herit. Folk Stud.*, vol. 4, no. 3, pp. 371–387, 2013.
- [2] N. N. Nwankpa, "Sustainable Agricultural Development in Nigeria: A Way Out of Hunger and Poverty," *Eur. J. Sustain. Dev.*, vol. 6, no. 4, pp. 175–184, 2017.
- [3] K. O. Onyele and E. B. Nwokocha, "THE RELATIONSHIP BETWEEN CAPITAL FLIGHT AND POVERTY : THE CASE OF NIGERIA," vol. 16, no. 3, pp. 225–236, 2016.
- [4] FAO, "Fighting Poverty and Hunger: What Role for Urban Agriculture?," *Econ. Soc. Perspect.*, p. 2, 2010.
- [5] N. O. Franklyn C, Mohammed A, "The adoption fo information and communication technology(ICT) in agricultrue in Adamawa state, Nigeria," *African J. Agric. Res. Dev. Vol. 5, Number 3, 2012*, vol. 5, no. 3, pp. 79–85, 2012.
- [6] K. G. Jayade and P. G. Khot, "Impact of Ict and Mobile Technology in Agriculture," *Int. J. Emerg. Technol. Comput. Appl. Sci. (IJETCAS)*, pp. 428–432, 2014.
- [7] N. Uphoff, "Empowerment of Farmers through ICT," no. 1980, p. 19, 2012.
- [8] E. E. Williams and I. S. Agbo, "Evaluation of the Use of Ict in Agricultural Technology Delivery to Farmers in Ebonyi State , Nigeria .," vol. 3, no. 10, pp. 18–27, 2013.
- [9] R. M. Al-Hassan, I. S. Egyir, and J. Abakah, "Farm household level impacts of information communication technology (ICT)-based agricultural market information in Ghana," *J. Dev. Agric. Econ.*, vol. 5, no. 4, pp. 161–167, 2013.
- [10] S. Mittal and G. Tripathi, "Role of Mobile Phone Technology in Improving Small Farm Productivity," *Agric. Econ. Res. Rev.*, vol. 22, pp. 451–459, 2009.
- [11] E. A. Nnenna, "Access and application of information and communication technology (ICT) among farming households of south east Nigeria," *Agric. Biol. J. North Am.*, vol. 4, pp. 605–616, 2013.
- [12] N. O. Anyaoha, "Assessing the effects of e-wallet scheme in farm inputs distribution to rural farmers in Imo State , Nigeria," vol. 6, no. July 2012, pp. 34–41, 2016.
- [13] "NITDA IT Centres." Abuja, 2017.
- [14] B. Jac, W. Bruinsma, and F. Neuman, "How ICT can make a difference in agricultural livelihoods Information & Communication Technologies," *Commonw. Minist. Ref. B.*, no. Iicd, pp. 2–4, 2007.
- [15] R. Syiem and S. Raj, "Access and Usage of ICTs for Agriculture and Rural Development by the tribal farmers in Meghalaya State of North-East India," *J. Agric. Informatics*, vol. 6, no. 3, pp. 24–41, 2015.
- [16] A. F. A. B. T. Mohammed, "Comparative analysis of

- gender involvement in agricultural production in Nigeria,” *J. Dev. Agric. Econ.*, vol. 4, no. 8, pp. 240–244, 2012.
- [17] Olaniyi, A. O, Adetumbi, S I, Adereti, and M A, “Accessibility and relevance of information and communication technologies (ICTS) among cassava farmers in Nigeria,” *African J. Agric. Res.*, vol. 8, no. 35, pp. 4514–4522, 2013.
- [18] O. P. Fawole and B. R. Olajide, “Awareness and Use of Information Communication Technologies by Farmers in Oyo State, Nigeria,” *J. Agric. Food Inf.*, vol. 13, no. 4, pp. 326–337, 2012.
- [19] N. F.N., C. J., E. H.A., E. J.A., and A. C.N., “Ict for Agriculture Knowledge Management in Nigeria: Lessons and Strategies for Improvement,” *Sci. J. Agric. Res. Manag.*, vol. 2012, 2012.

