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Analysis of Accessibility and Level of Knowledge of Farmers on the Use of ICT among Small Holder Rice Farmers in Southeast, Nigeria

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ABSTRACT

The study examined Analysis of accessibility and Level of Knowledge of Farmers on the Use of ICT among small holder rice farmers in Southeast, Nigeria. Specifically, it described ICT accessibility and level of knowledge of farmers in the use of ICT and Significant relationship between the farmers' accessibility and knowledge and their level of use of ICT. Data were collected with a well-structured questionnaire from 476 randomly selected rice farmers and were analyzed using a combination of analytical tools such as descriptive statistics, Analysis of variance, correlation and z-test. The information on ICT tools/format accessibility revealed that out of all the accessible ICT tools/format, only Radio set, Television, Mobile Phone, Short Message Services, and On-line Magazines were effectively used. It was discovered that rice farmers have a low knowledge on the use of ICT in their rice farms. Information meant for rice farmers should be tailored to their specific need and more trainings should be organized for rural people on the use of ICT tools/format to help boost their confidence and reliance on ICT gadgets for information were recommended.

Keywords: Analysis of accessibility, Level of Knowledge, ICT gadgets, small holder rice farmers, Southeast Nigeria

INTRODUCTION

Nigeria is one of the sub Saharan African countries of which agriculture was the back bone of her economy before the oil boom of 1970s. Nigeria agriculture is the major source of food and accounts for about 35% of the Gross Domestic Product (GDP), 37% of merchandised export, 75% of the rural household income and 70% of employment (Ezeano, Ume, Okeke and Gbughemobi (2017). Gbughemobi, Meludu and Nkamigbo (2021) opined that agriculture is the engine of growth for most developing countries of the world and also one of the most effective ways to alleviate poverty and hunger. It can raise income and improve food security for 80% of the world's poor, who live in rural areas and work mainly in farms. Agriculture in Africa has a massive social and economic footprint; more than 60% of the populations of Sub-Saharan Africa are smallholder farmers, and about 23% of Sub-Saharan Gross Domestic Product (GDP) comes from agriculture (Goedde, Ooko-Ombaka and Pais, 2019). Agriculture contributed about 22.86% of Nigeria's GDP in 2017 (National Bureau of Statistics (NBS), 2018). These smallholder farmers engage in different livestock and crops production including rice.

Nigeria is Africa's largest importer of rice, the current leading consumer of rice and one of the largest producers of rice in Africa; and rice generates more income for Nigerian farmers than any other cash crop in the country (FAO, 2019). Rice is the primary staple food for most of the populace in the region, especially the rural area, with about 6% of global rice consumption, Africa

accounts for about 4% of the world production making the continent the second largest consuming region (Abdul-Gafar, 2016). According to Uba (2003), about 70% of Nigeria feeds on rice, while 30% of their cereal-based diets are also from rice. According to Udemezue (2018), Nigerians consume 8 million tonnes of rice and the figure rises by 6% annually. Programs, projects, and technologies like Value Addition and Information Communication Technologies (ICTs) have been introduced in rice production and agricultural sector to enhance farmers' agricultural production.

Information Communication Technology (ICT) can be broadly described as the means through which information can be communicated for individual, societal and collective growth of a nation (Ogunyemi, 2010). Information and Communication Technologies (ICTs) are becoming more and more important in connecting farmers and providing information. ICTs help keep young people involved in agriculture.

ICTs are used to champion practical, cost-effective, and scalable solutions that impact lives. ICTs have a high potential to transform agriculture. They are "means" rather than the "ends". Information and communication technologies (ICTs) could transform agricultural activities in many parts of the world. ICTs cannot solve every problem, but these tools do promote youth involvement in agriculture by enhancing their opportunities, motivation, and capacities. ICTs contribute to improving youth livelihoods, agricultural modernization and create benefits throughout value chains, especially through increased access to more effective information via many smartphone apps (Spore, 2019). ICTs also help strengthen and develop farmers' organizations, especially through social networks. Access to information holds the key to successful agricultural development. Information Communication Technologies (ICTs) in recent years have witnessed major changes and are diverging as a powerful tool for accelerating agricultural growth in a developing country like Nigeria (Enwelu, Uramah, Asadu, and Chan 2014). The introduction of ICTs helps in agricultural farmer's access to market information and services, management of pest and diseases and rural development programs (Meera, Jhamtani and Roa, 2004). It will also help in broadening the orientation of farmers in production activities thereby causing a major turnaround in the agricultural sector as it is doing many in other sectors (Ajayi, Alabi and Akinsola, 2013).

Access refers to the ways and means in which individuals, communities, and institutions are exposed to the use of ICT. It takes into consideration such elements as affordability and availability of the technologies. The geographical location of the access point and the times at which the technologies are available (Ekeanya, Omike, Ifenkwe and Apu, 2017) Ozor and Madukwe (2009) asserted that providing farmers with a variety of information sources, which are accessible, affordable, relevant and reliable is the ultimate aim of providing agricultural information service. These information sources must be communicated to the relevant users - farmers.

The role of ICT to enhance food security and support rural livelihood is increasingly recognized and was officially endorsed at the World Summit on the Information Society (WSIS) in 2005. These include the use of computers, the internet, Geographical Information Systems (GIS), mobile phones, as well as traditional media such as radio and television. Although it is a relatively new phenomenon, evidence of the contribution of ICT to agricultural development and poverty alleviation is becoming increasingly available. The introduction of various relevant ICTs in agricultural information dissemination could help farmer's access market information; land resources and services; management of pests and diseases; rural development programs (Meera *et al*, 2004). It will also help in broadening the orientation of

farmers in production activities thereby causing a major turnaround in the agricultural sector as it is doing in many other sectors. In Nigeria, policy on the adoption of ICTs was initiated in the year 1999 when the civilian regime came into power (Posa, 2006).

ICTs have a vital role to play in getting information to farmers but many rural communities still have little or no access to it. ICTs have a transformation influence on farming and food production in countries where governments and policymakers are committed to developing comprehensive e-agricultural strategies.

However, given the urgent need for current, reliable, and accurate agricultural knowledge, and in function upon which agricultural policies could be based on sustainable rural agricultural development, many initiatives are warranted, such as training of youths on ICTs (especially in rural areas) and competition on ICT uses in agriculture. Therefore, to benefit the rural people, extensionists are grappling with the issues of how to harness ICTs to improve rural livelihoods to contribute toward better information exchange and access. It is against this background that this study was set out to investigate the knowledge, access and use of ICT among rice farmers in the southeast, Nigeria.

MATERIALS AND METHODS

The study was conducted in Southeast Nigeria. The population of the study consists of all the rice farmers in Southeastern Nigeria. The zone comprises of Imo, Anambra, Abia, Enugu and Ebonyi States. The region is located between latitude $5^{o}45^{'}00^{"}$N and longitude $8^{o}30^{'}00^{"}$E. It is bordered by the Niger River in the west with the total surface area of approximately 76000 square kilometers (29,400sqkm).The region has three types of vegetation. The coastal area in the south is dominated by mangrove swamps and tidal waterways.

Anambra State is located in the South-Eastern part of the country, and comprises 21 Local Government and four agricultural zones to aid planning and rural development. The climate is typically equatorial with two main seasons, the dry and the rainy seasons. It is known for production and marketing of several raw materials and agro products in different parts of the state. Some of the crops produce and marketed in the state include oil palm, maize, rice, yam, groundnut, cassava, garri, cucumber, watermelon, melon, potato, greenbeans (akidi) ,pigeon pea, soyabean and livestock such as fish, goat, sheep, poultry and cattle are also raised (Nkamigbo, Ugwumba and Okeke,2019). It is an agrarian state with high crop production and marketing activities. Majority of the people are subsistence farmers. It is situated on a generally low elevation on the eastern side of the river Niger, sharing boundaries with Delta State to the west Imo, Abia and Rivers States to the south, Enugu state to the East and Kogi State to the North. The state occupies an area of about 4,844km^2. Geographically, the state lies within longitude $5^{0}55^{1}$ and $6^{0}42^{1}$N.The population of the state is 4,182,232 with 863 sqkm density (NPC,2006). The annual rainfall ranges from 1400mm in the North to2500mm in the South with temperature of 25^{o}C-35^{O}C.

Ebonyi State is made up of 13 L.G.As with 5533 km^2 as the total landmass and estimated population of 2198371 (NPC 2006). The occupation of the people is predominantly farming with over 80 percent of the population living in rural area and is involved in agricultural production. The vegetation lies between the Rain Forest and Guinea Savannah of Nigeria.

Enugu State is located between latitude 6.5 ($6^{0}30'0$N) and longitude of 7.5 ($7^{0}30'0$E). The state occupies an area of about 8,022,950KM^2 (Ezike, 1998) and has a population of about 3,257,278 (NPC, 2006). The state has seventeen (17) Local Government Areas (LGA) and is divided into six (6) agricultural zones namely: Agbani, Awgu, Enugu, Enugu-Ezike, Udi and Nsukka.

Sampling Technique and sample size

A multi-stage sampling technique was adopted for this study to select 480 respondents among states in Southeast, Nigeria.

Stage 1: This involved purposive selection of three states with a high concentration of rice farmers in Southeast, Nigeria; (Anambra, Enugu and Ebonyi State).

Stage 2: Purposive selection of two (2) agricultural zones from each State making it a total of six (6) zones

Stage 3: Purposive selection of two (2) Local governments from each of the agricultural zones based on high concentration of rice farmers making it a total of twelve (12) local governments

Stage 4: Random selection of two (2) communities from each local government making it a total of twenty-four (24) communities

Finally, twenty (20) rice farmers were selected from each community using the simple random sampling technique. This gave a total sample of four hundred and eighty (480) respondents.

Method of Data collection and Analysis

Qualitative and quantitative methods were used to collect data from the respondents. Qualitative data were collected using focus group discussion (FGD).The researcher employed the use of Survey CTO which is a powerful, reliable and easy to use survey platform that allows one to at least transport and process data for academic research. Data were analyzed using descriptive analysis such as mean, frequency and percentage, Tobit regression model and inferential statistics (Analysis of variance, Spearman bivariate correlation, and Z-test).

Measurement of variables

Sex: Sex (dummy, male = 1, female = 0)

Age: Measured in years.

Marital status: single =1, married = 2, widow (er) = 3, separated = 4

Educational qualification: Number of years spent in School

Farming experience = Years

Farm size (Ha)

Household size

Primary occupation

Annual income = (₦)

Membership of a corporative

The level of knowledge of ICT: farmers were asked to tick yes or no to assess their knowledge from the list of statements about ICT. The respondents were allowed multiple responses as they may have more than one knowledge of the subject under discussion. Based on the rule of thumb, level of knowledge is categorized into three as low knowledge with a value of 2, medium knowledge with a value of 4, and high knowledge with a value of 6. A ratio representation of these indicates that variables with percentage value less than 33.3% is low knowledge, while 33.3% to less than 50.0% is medium knowledge, and high knowledge ranges from 50.0% and above.

Attitude of the farmers The farmers were asked to rate their feelings on ICT, on a 5-point Likert scale of strongly agree (5) agree (4) somewhat agree (3) disagree (2) strongly disagree (1)

Available ICT for use the respondents were asked to tick from the list of the available ICT provided. The respondents were allowed multiple responses as more than one ICT tools/ format maybe available to them.

Level of access to ICT the farmers were asked to rate their access to available ICT on a 5-point Likert scale. The Likert scale and their corresponding values include highly accessible = 5; accessible = 4, moderately accessible = 3, barely accessible = 2 and strongly not accessible = 1. The values will be added to get 15, which will be divided by 5 to get a mean score of 3.Variables with a mean score of 3 and above will be regarded as accessible while variables with a mean score less than 3 were regarded as not accessible.

Challenges faced by farmers on the use of ICT: 5- point Likert scale, with

options of very serious = 5; serious = 4; somewhat serious = 3; not serious = 2; not a problem = 1. The farmer's rating was subjected to a principal factor analysis (PFA) matrix to ascertain the factor loading.

Level of usage of ICT by the farmers. The farmers were asked to rate their extent of use of ICT available to them on a 5-point Likert scale of very often = 5; often = 4; moderate = 3; rarely = 2 and never used = 1. The values were added to get 15 and divided by 5 to get the mean value of 3 Any variable with a mean score 3 and above was regarded as being used frequently by farmers while variable with a mean score of less than 2 was regarded as not being used frequently.

RESULT AND DISCUSSION

ICT Accessibility

The ICT accessibility in the study area is presented in Table 1. The information was subjected to a 5 Point Likert Scale to determine the mean threshold of ICT tools/format accessibility. The mean threshold of less than 3.0 was not accessible, while the mean threshold of 3.0 and above was said to be accessible to the farmers. Thus, based on the 24 items of ICT tools/format accessibility captured, only 6 had a mean threshold of 3.0 and are; Radio set, Television, Facebook, Mobile Phone, Short Message Services and Whatsapp. The cluster mean of 2.54 shows that the majority of the ICT tools/format were not accessible, while the standard deviation of 1.01 shows that their individual responses varied enough to make logical conclusions. This is expected since the ICT tools were scarcely available in the study area. The finding agrees with (Enwelu *et al*, 2014) who discovered that farmers had low access to modern ICT tools.

Table 1: Distribution of ICT Accessibility in the Study Area

S/n.	Tools	SNA	BA	MA	A	SA	Mean	Std. Dev.	Decision
1.	Radio set	0	11	113	207	145	4.66	0.51	Accessible
2.	Television	51	117	93	144	71	4.02	0.80	Accessible
3.	Facebook	24	0	8	261	183	3.14	1.25	Accessible
4.	Mobile Phone	11	71	253	81	60	4.27	0.73	Accessible
5.	Short Message Services	79	249	40	74	34	3.23	0.93	Accessible
6.	CD-ROM	95	214	11	122	34	2.44	1.15	Not accessible
7.	Video CD Player	62	170	78	91	75	2.55	1.26	Not accessible
8.	Computer System	59	168	91	83	75	2.89	1.30	Not accessible
9.	Internet	126	267	34	22	27	2.89	1.28	Not accessible
10.	Digital Camera	151	173	33	99	20	2.07	1.01	Not accessible
11.	YouTube	219	180	14	43	20	2.29	1.23	Not accessible
12.	Multimedia Projector	163	176	48	62	27	1.88	1.10	Not accessible
13.	Digital video Disk (DVD)	104	122	79	122	49	2.19	1.20	Not accessible
14.	E-mail	222	152	56	46	0	2.77	1.32	Not accessible
15.	On-line Magazines	121	299	28	28	0	1.84	0.97	Not accessible
16.	GPRS	40	97	36	212	91	1.92	0.74	Not accessible
17.	Whatsapp	59	192	98	71	56	3.46	1.24	Accessible
18.	Instagram	203	213	19	41	0	2.73	1.20	Not accessible
19.	Video Conferencing	293	143	26	14	0	1.79	0.88	Not accessible
20.	Tele Conferencing	332	138	6	0	0	1.5	0.73	Not accessible
21.	Robots	332	138	6	0	0	1.33	0.55	Not accessible
22.	Twitter	217	126	32	46	55	2.15	1.39	Not accessible
23.	Likee (Online Video posting)	117	26	27	0	0	1.53	0.84	Not accessible
24.	Mixler (Online Radio)	318	118	33	7	0	1.43	0.69	Not accessible
	Cluster mean						**2.54**	**1.01**	**Not accessible**

Source: Field Survey Data, 202

Level of Knowledge of Farmers on the Use of ICT

The farmer's knowledge of information and communication technology (ICT) is presented in Table 2. The respondent's knowledge is descriptively presented and ranked using multiple responses format, the Table shows that first five knowledge definition as identified by the farmers were; ICT are technologies that facilitates communication, processing and transmission of information by electronic

means, ICTs are communication hardware adopted in ensuring instant dissemination of information, ICT includes a range of rapidly evolving technologies and they include telecommunication technologies, ICT consists of hardware, software telecommunication networks, work status and robotics as well as smart chips used in collecting, processing, storage and transmission of information by electronic means, and ICTs are electronic devices for capturing, processing storage and communicating information. The order of their percentage representation is 80.0%, 24.8%, 21.0%, 20.2% and 13.9%. Summarily, the respondents have a low knowledge on the use of ICT in their rice farms. This is in line with the findings of (Ajayi, Alaba, Okanlawon, 2018) that farmers have low knowledge on the use of information and communication technology.

Table 2: Distribution of Knowledge of Farmers on the Use of ICT in the Study Area

Sn.	ICT Tools/formats	Freq.	Per.	Ranking
1.	ICTs are communication hardware adopted in ensuring instant dissemination of information	118	24.8	2
2.	ICT includes a range of rapidly evolving technologies and they include telecommunication technologies	100	21.0	3
3.	ICT consists of hardware, software telecommunication networks, work status and robotics as well as smart chips used in collecting, processing, storage and transmission of information by electronic means	96	20.2	4
4.	ICT are technologies that facilitates communication, processing and transmission of information by electronic means	381	80.0	1
5.	ICTs are electronic devices for capturing, processing storage and communicating information	66	13.9	5
6.	ICT are means through which information can be communicated for individual, societal and collective growth of a nation	58	12.2	6

Source: Field Survey Data, 2020. *Multiple Response

Level of Knowledge of Farmers on the Use of ICT

Majority (78.2%) have low knowledge of ICT, while others have medium knowledge (20.4%) and high knowledge (1.5%). The mean knowledge of 28.9 falls within low knowledge which justifies that ICT has a low or weak knowledge among the farmers. Equally, the standard deviation of 20.44 is high enough to show the variability of their responses for decision making.

Table 2.2: Distribution of Knowledge of Farmers on the Use of ICT

Possible score	Observed score	Classification	Frequency	Percentage	Mean	Std. dev
0 – 100	17 – 100	Low (up to 49)	372	78.2		
		Medium (50-69)	97	20.4	28.9	20.44
		High (above 69)	7	1.5		
		Total	**476**	**100**		

Source: Field Survey Data, 2020.

Significant relationship between the farmers' accessibility and their level of use of ICT

The result of hypothesis on the relationship between the farmer's ICT accessibility and level of use of ICT tools/format is in Table 3. The spearman Bivariate correlation for non-parametric tool conducted to test the significant correlation between the level of use of ICT tools/format and accessibility in the study area was positive and significant at two tailed probability level of 0.01. This implies that a unit increase in the accessibility of ICT tools/format will positively increase its (ICT tools/format) level of use in the area by 0.826 units. Thus, the null hypothesis three was rejected. This result is in conformity with the results obtained by (Raghuprasad, Devaraj & Gopala,2012)

Table 3: Significant relationship between the farmers' accessibility and their level of use of ICT (n = 476)

Correlations			Use	Accessibility
Spearman's rho	Use	Correlation Coefficient	1.000	0.826**
		Sig. (2-tailed)	.	0.000
		N	476	476
	Accessibility	Correlation Coefficient	0.826**	1.000
		Sig. (2-tailed)	0.000	.
		N	476	476
****. Correlation is significant at the 0.01 level (2-tailed).**				

Source: Field Survey Data, 2020. Bivariate correlation matrix

Significant relationship between Farmers' knowledge and their level of use of ICT

The result of hypothesis on the influence of farmer's knowledge on the use of ICT tools/format is in Table 4. The result on the influence of knowledge on use of ICT tolls/format had a sum square between group and within group of 105.32484 and 181.3182 respectively. The total degree of freedom was 475. The F-stat. value of 60.40*** is highly significant at probability level of 1%. This significant F-distribution shows the normality of the variables. Thus, the null hypothesis four was rejected and the alternate accepted that knowledge influence the use of ICT tools/format. This agrees with the findings of John and Barclay (2017).

Table 4: Significant relationship between Farmers' knowledge and their level of use of ICT (n = 476)

Source	Sum Square	Degree of freedom	Mean square	F-stat.	Prob>F
Between knowledge	105.32484	4	26.33121	68.40***	0.000
Within knowledge	181.3182	471	0.38495502		
Total	**286.23560**	**475**	**0.6034498**		

Source: Field Survey Data, 2020. One-way ANOVA. F-stat. at 1.96 (prob> 0.05)

SUMMARY AND CONCLUSION

The study examined the analysis of accessibility and Level of Knowledge of Farmers on the Use of ICT among small holder rice farmers in Southeast, Nigeria. Data were collected with a well-structured questionnaire from 476 randomly selected rice farmers and were analyzed using a combination of analytical tools such as descriptive statistics, Analysis of variance, correlation and z-test. The information on ICT tools/format accessibility reveals that Radio set, Television, Facebook, Mobile Phone, Short Message Services and Whatsapp were accessible. Out of all the accessible ICT tools/format, only Radio set, Television, Mobile Phone, Short Message Services, and On-line Magazines were effectively used. The result also revealed a low knowledge on the use of ICT among rice farmers in the South Eastern Nigeria. Information meant for rice farmers should be tailored to their specific need and more trainings should be organized for rural people on the use of ICT tools/format to help boost their confidence and reliance on ICT gadgets for information were recommended.

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