Innovations

Use of Information and Communication Technology Among Village Extension Agents and Farmers in South-South, Nigeria

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Abstract
This study examined the use of information and communication technologies among village extension agents and farmers in south-south Nigeria. Multistage sampling technique was used to select a total number of 480 respondents from the study area. Two sets of questionnaires were used, data obtained were analysed using frequency counts, mean score, standard deviation and z-test. The results showed that majority of the VEAs were male (54.7%), married (89%), had average age of 45 years while majority of the contact farmers were female (56.7%), married (95.6%) and had average age of 50 years. The mean household size for VEAs was 4 while that of contact farmers was 6. Higher percentage (87.3%) of VEAs had tertiary education, while 35% of the contact farmers had tertiary education. The ICT used by the farmers included mobile phone (GSM) ($\bar{x} = 3.77$), radio ($\bar{x} = 3.70$), television($\bar{x} = 3.51$), video ($\bar{x} = 2.56$), computer ($\bar{x} = 2.53$), personal e-mail ($\bar{x} = 2.51$), and internet ($\bar{x} = 2.50$). The constraints to ICT use were lack of internet access in the rural areas, lack of ICT infrastructure, high cost of internet subscription, lack of training on ICT, among others. The z-test result shows that there was a significant difference (M=0.41) in the level of ICT facilities used by VEAs and contact farmers. It was recommended that the states ADPs should mount aggressive training on the importance of ICT use in agricultural extension delivery to sensitise VEAs and farmers to increase their quest for knowledge and improved skills.

Keywords: *ICT Use, VEAs, Contact Farmers, Extension services.*

Introduction

A significant number of African countries continue to be very dependent on agriculture. Over 80% of people who live in rural areas of developing nations are directly reliant on agriculture, according to the International Food and Agricultural Programme (2004). However, agricultural development is not widespread in Sub-Saharan African countries. Agriculture has been Nigeria primary employment of labourers. Agriculture contribution to Nigeria's GDP (gross domestic product) has increased recently. The poor application of technology is only one of the problems that afflict agriculture, despite its positive benefits on the Nigerian populace (Awhareno, Omoregbe, &Ekpebu, 2013). According to Adetumbi et al. (2013), one of the most essential resources for agricultural development is access to information. Mojisola et al. (2007) assert that the establishment of knowledgeable agricultural communities is essential to the development of rural and agrarian regions. Achieving this may be done with minimal stress since certain information and communication technologies (ICTs), like mobile phones, are adaptable and lucrative (Gadzama& Akinola, 2013). According to Madukwe (2006) and Adeniyi (2010), ICTs may be the only way for farmers to access a range of information sources that are easily accessible, inexpensive, relevant, and reliable. Information on agricultural technology developed at research institutes is processed and disseminated slowly. ICTs have the potential to enhance the integration and effectiveness of farming systems by opening up new communication channels and facilitating access to information on market price, production techniques, and post-production technology. It is undeniable that ICTs can

support agricultural extension in developing countries. The use of ICTs in agricultural extension is nearly limitless, as the graphic above illustrates.Farmers may be reached directly by the village extension agent (VEA), who is at the base of the extension service distribution pyramid. The village extension agent must communicate, instruct, and educate agricultural families to help them better their living circumstances. The village extension agent does this by offering the rural families pertinent and useful technology based on research. Usually, technical information is provided along with this to help farmers comprehend the potential of the technologies and develop the necessary skills for their application. The village extension agent uses a variety of tools and communication strategies in order to accomplish this task. Information and communication technology (ICT) is one of them, and it has drastically altered people social, economic, and political lives on a global scale.

One key area where ICTs may have a significant impact is in the agricultural extension service, which encompasses training, research, the dissemination of innovative farming techniques to farmers, as well as feedback from farmers. The use of computers and the internet (cyber extension) has expanded the reach of electronic information distribution in India beyond the usage of radio, television, and projectors. According to Sharma (2007), it is feasible to use the potential of internet-based technologies to satisfy the farmers' demands for location-specific agricultural information. Additionally, he noted that farmers are already utilising the internet to get technical guidance from a variety of research sites. Nowadays, farmers in rural areas may bring their own E-mail accounts, which allows for quicker communication. Extension agents, radio, and neighbours/relatives are, in decreasing order of significance the most significant sources of information for farmers in Nigeria, according to many research (Awhareno, 2011). including with the debut and growth of the worldwide system of mobile communication (GSM),according to Agwu et al. (2008), the use of telephones for extension distribution is relatively restricted since the majority of ADPs, including those at the headquarters, lack functioning lines.

ICTs are networking instruments between and among the stakeholders in agriculture, according to evidence from various countries throughout the globe. Extension agents and rural farmers in India now access and acquire technical knowledge from many research sources via the internet, websites, and their personal E-mail accounts to increase their production capacity (Sharma, 2007). In Nigeria, the Federal Ministry of Agriculture and Rural Development, Abuja, launched the Farm Radio Network (FRN) in 2004 in partnership with the Food and Agriculture Organisation of the United Nations, with the goal of converting extension agents and rural farmers into internet users (Idu&Obinne, 2009). For the last eleven years, it has been thought that Nigerian village extension agents and rural farmers would have developed an online following. In order to support government investment, it is crucial to know how much internet access and use village extension agents have.

Objective of Study

The overall objective of the study was to examine the use of ICT among VEAs and farmers in South-South Nigeria. Specifically, the study is designed to:

a. examine the socioeconomic characteristics of the village extension agents {VEAs} and farmers in the study area,
b. determine the constraints to the use of ICT facilities by VEAs and farmers and;
c. ascertain the level of use of ICT among VEAs and farmers.

Hypothesis of the Study

There is no significant difference between the VEAs and farmers' level of use of ICT.

Methodology

The study was conducted in south-south Nigeria. South-South Nigeria is one of the six geopolitical zones of Nigeria. It's divided into six states of Edo, Delta, Bayelsa, Rivers, Akwa-Ibom and Cross River with a population of 21,044,081 and a growth rate of 2.83 percent per annum {Niger Delta Development Commission, 2008}. The area is characterised by the tropical hot monsoon climate and a high annual rainfall which varies within the Delta. There are large deposits of crude

oil and natural gas in the area. Fishing and farming are the principal occupations of the inhabitants of the zone. Plantain, cassava, oil palm, coconuts, rubber trees, and citrus fruits are some of the crops grown in the zones.

The target population for the study consist of all village extension agents of the state's ADPs andtheir contact farmers. A multistage random selection technique was used in selecting the respondents. First stage involved the selection of three states of Delta, Rivers and Akwa-Ibom.Using a 40% proportional sample throughout the 12 agricultural zones of the three states that were chosen,a total number of 300 village extension agents were selected. For the farmers, 60 contact farmers were sampled from each of the three selected states for the study. The 60 contact farmers were drawn from the areas covered by the village extension agents {VEAs} that were sampled for the study. This gave a total of 180 contact farmers. That gave a total of 480 respondents that were used for this study. Data for the study was collected from the respondents through the use of two sets of questionnaires. Data were analysed using frequency counts, percentage mean score, standard deviation and z-test was used to test the hypothesis.Constraints to ICT use were analysed with mean and standard deviation on a 4-point Likert-type rating scale of extremely serious = 4, very serious = 3, serious = 2, and not serious = 1. The weight of the scales were added and divided by the number of scales; $\left(\frac{4+3+2+1}{4} = 2.5\right)$. Mean score of 2.5 and above was considered as constraint, while mean score below 2.5 was discountenanced.

Level of use of ICT facilities was analysed with percentages, mean and standard deviation. The percentage of each response to the scale of the item was computed, and the mean was computed by adding the weights of the 4-point Likert-type scale of use very often = 4, use often = 3, use sometimes = 2 and never use = 1 and dividing by the number of the scale; $\frac{4+3+2+1}{4} = 2.5$.A mean score of 2.5 and above were considered as those ICT used, while a mean score below 2.5 was discountenanced and considered not used.

Results and Discussion

Table 1 shows that a more significant percentage {45.7%} of VEAs were between the age range of 40 to 49 years with a mean age of 45 years, while the majority {32.8%} of contact farmers were also between the age range of 40 to 49 years with a mean age of 50 years. This implies that majority of the respondents are still within their middle, active and productive ages and hence there is high prospect of ICT usage. Data also shows that the majority {54.7%} of VEAs were male while the remaining {45.3%} were female. Thisattests to the fact that males dominate the public service. However, for contact farmers, females accounted for a higher proportion {56.7%} while {43.3%} were male. This negates the fact that males own and control farmland in the study area. Table 1 also revealed that the majority {89%} and {95.6%} of both VEAs and contact farmers, respectively, were married. The data in the table indicate that a higher percentage {50.3%} of VEAs had a household size of 4-6 members with a mean household size of 4. This means that the household size of VEAs was relatively small. This can encourage ICT usage as the cost of running the family may not be very high. On the contrary, the majority {35.6%} of farmers had a household size of 4-6 members with a mean household size of 6. This relatively large household size could be a drawback to ICT usage but a source of cheap farm labour. The result also indicates that a higher proportion {87.3%} of VEAs had tertiary education. Moreso, about {35%} of farmers had tertiary education while {33.9%} ended their education in primary school. Higher literacy level will aid access and use of information {Torimiro, 1997}. Data also indicates that {44.3%} of VEAs had 21 – 30 years of working experience while {45.6%} of farmers had over 31 years of farming experience that could expose them to better means of getting information that will improve their farm productivity. Table 1 shows that {31.7%} and {21.1%} of contact farmers had a farm size of 2 hectares and above and 0.1 – 0.5 hectares respectively. The table also revealed that majority {66.1%} of contact farmers had weekly contact with VEAs.

Table 1: Distribution of respondents according to socioeconomic characteristics

Variables	Village Extension Agents			Contact Farmers		
	Frequency	%	Mean	Frequency	%	Mean
Age						
30	23	7.7		10	5.6	
30 – 39	29	9.7		15	8.3	
40 – 49	137	45.7	45	59	32.8	50
50 – 59	111	37.0		51	28.3	
60 >				45	25.0	
Sex						
Female	136	45.3		102	56.7	
Male	164	54.7		78	43.3	
Marital Status						
Single	22	7.3		8	4.4	
Married	267	89.0		172	95.6	
Separated	11	3.7				
Divorced						
Household Size						
1 – 3	90	3.0		45	25.0	
4 – 6	151	50.3		64	35.6	
7 – 9	59	19.7	4	47	26.1	6
10 – 12				18	10.0	
13 >				6	3.3	
Level of Education						
No formal education				12	6.7	
Primary education				61	33.9	
Secondary education	37	12.3		44	24.4	
Tertiary education	263	87.6		63	35.0	
Working Experience						
1 – 10	43	14.3		29	16.1	
11 – 20	98	32.7		31	17.2	
21 – 30	133	44.3		38	21.1	
31 and Above	26	8.7		82	45.6	
Farm Size						
0.1 – 0.5 ha				47	26.1	
0.6 – 1.0 ha				20	11.1	
1.1 – 1.5 ha				28	15.6	
1.6 – 2.0 ha				28	15.6	
> 2.0 ha				57	31.7	
Contact with Extension						
Not at all				6	3.3	
Once a month				49	27.2	
Twice monthly				6	3.3	
Weekly				119	66.1	

Source: Field Survey Data (2022).

VEAs and farmers' level of ICT use

Table 2 shows the VEAs and contact farmers' level of ICT use. Based on the 2.50 discriminating index, seven (7) out of fifteen (15) listed ICT facilities had mean values above the discrimination index (≥2.50) and thus were adjudged the ICT facilities the VEAs and contact farmers used. For the VEAs, the GSM (phone) had the highest mean value of 3.77 with a standard deviation of 0.72. This was closely followed by radio and television with 3.70 and 3.51 mean values and standard deviations of 0.68 and 0.90, respectively. Video had 2.56 mean score and standard deviation of 1.11, while the computer had a 2.53 mean value and 1.13 standard deviation. Also, personal e-mail had a 2.51 mean score and 1.33 standard deviation, while internet had a 2.50 mean score and 1.16 standard deviation. However, for contact farmers, the GSM {phone} had the highest mean value of 3.70 with a standard deviation of 0.80. This was also followed by radio with a 2.50 mean score and a standard deviation of 1.38. These were the only ICT adjudged to have been used by farmers. The level of ICT use was generally low. The low use of ICT by farmers can be linked to their low level of education. A large proportion of the rural farming population in Nigeria are illiterate {Ekong, 2010}. In Nigeria, mobile cinema, video, television, radio and GSM (phone) are the major ICT facilities used by the majority of extension workers (Arokoyo, 2005). The study byAdejo and Haruna (2009), Asadu*et al.*(2013) and Adejo, Edoka and Adejoh (2013) also confirmed that GSM (phone), radio, television and computer are the major ICT facilities used by extension workers across Nigeria. Considering the importance of these ICT facilities to extension service, sustained access to them is required.

Table 2: Distribution of VEAs and farmers' level of ICT use

	Contact Farmers		VEAs	
ICT Facilities	**Mean**	**SD**	**Mean**	**SD**
1. Phones (GSM)	3.60*	0.80	3.77*	.72
2. Radio	2.52*	0.99	3.70*	.68
3. Television	2.50*	1.00	3.51*	.90
4. Video	1.76	1.26	2.56*	1.11
5. Computer	1.63	1.17	2.53*	1.13
6. Personal e-mail	1.88	1.30	2.51*	1.33
7. Internet	1.76	1.24	2.50*	1.16
8. Personal website	1.47	0.95	1.89	1.19
9. Cinema	1.62	1.20	1.67	.95
10. CD-ROM	1.06	0.35	1.44	.80
11. Organisational e-mail	1.12	0.45	1.27	.56
12. Organisational website	1.19	0.51	1.25	.53
13. Digital wallet (E-wallet)	1.25	0.75	1.21	.48
14. Geographic information system (GIS)	1.09	0.34	1.20	.41
15. Blog	1.08	0.33	1.07	.26

*Significant (mean ≥ 2.50) Grand mean = 2.14

Source: *Field Survey, 2022.*

Constraints to the use of ICT facilities by VEAs and contact farmers

The result in Table 3 shows the VEAs and farmers' constraints to the use of ICT facilities. Based on 2.50 discrimination index, thirteen (13) out of the sixteen (16) listed limitations had mean values above the discrimination index (≥2.50) and thus were adjudged severe conditions to ICT facilities used by VEAs. Lack of internet access in the rural area had the highest mean value of 3.61 with a standard deviation of 0.71. Lack of ICT infrastructure had a 3.53 mean score and a standard deviation of 0.81. The high cost of internet subscription had a mean value of 3.47 and a standard deviation of 0.76, while lack of training on ICT had a 3.42 mean score and 0.88 standard deviation. This was followed by lack of competence in handling ICT facilities, with a mean value of 3.31 and a standard deviation of 0.91. The high cost of ICT facilities and accessories had a 3.30 mean value and a standard deviation of 0.64. Also, lack of power supply had a 3.23 mean score and standard deviation of 0.88, while poor income had a 3.14 mean value and 1.01 standard deviation. Poor communication network had 3.12 mean score and a standard deviation of 0.89. Lack of trained computer personnel had 3.04 and a standard deviation of 0.92, while unavailability of spare parts had 2.86 mean score and standard deviation of

0.81. Following this was complexity in using ICT facilities with mean score of 2.85 and 0.87 standard deviation. Lack of awareness of ICT importance had 2.59 mean score and a standard deviation of 1.19. The standard deviation values for constraints adjudged to be serious to ICT facilities used by VEAs were relatively small. These low standard deviation values implies that VEAs strongly agreed to the adjudged constraints as serious constraints to ICT facilities. For farmers, lack of training in ICT facilities had the highest mean value of 3.66 with a standard deviation of 0.65. Lack of infrastructure had 3.44 mean score and a standard deviation of 0.74. Lack of internet access in the rural area had 3.39 mean score and a standard deviation of 0.82. This was followed by high cost of internet subscription with a mean score of 3.29 and a standard deviation of 0.82. Poor power supply had 3.26 mean score and a standard deviation of 0.75. Also, lack of competence in handling ICT facilities had a mean score of 3.18 and a standard deviation of 0.85. Poor income had a mean score of 3.16 and a standard deviation of 0.83. Lack of trained personnel, poor communication network and high cost of ICT facilities had mean scores of 3.14, 3.08, 2.98 and standard deviations of 0.73, 0.78 and 0.93, respectively. Others included unavailability of spare parts, complexity in using ICT facilities and lack of awareness of ICT importance, with mean scores of 2.84, 2.79, 2.79 and standard deviation of 0.99, 0.90 and 1.02, respectively. VEAs and farmers indicated the same thirteen listed items as serious constraints. Supporting the above findings, Asadu*et al.* (2013) observed that illiteracy among farmers, limited power supply, high cost of modern communication techniques, the complexity of use, limited network services, lack of access to modern communication techniques and lack of skill among the extension agents constitute serious constraints to the use of ICT facilities by VEAs in Niger State.

Table 3: Distribution of constraints to the use of ICT facilities by VEAs and farmers

	Contact Farmers		**Extension Agents**	
	Mean*	**SD**	**Mean***	**SD**
Lack of internet access in the rural area	3.39*	0.82	3.61*	.71
Lack of ICT infrastructure	3.44*	0.74	3.53*	.81
High cost of internet subscription	3.29*	0.82	3.47*	.76
Lack of training on ICT	3.66*	0.65	3.42*	.88
Lack of competence in handling ICT	3.18*	0.85	3.31*	.91
High price of ICT facilities and accessories	2.98*	0.93	3.30*	.64
Lack of power supply	3.26*	0.75	3.23*	.88
Poor income	3.16*	0.83	3.14*	1.01
Poor communication network	3.08*	0.78	3.12*	.89
Lack of trained computer personnel	3.14*	0.73	3.04*	.92
Unavailability of spare parts	2.84*	0.99	2.86*	.81
Complexity in using ICT facilities	2.79*	0.90	2.85*	.87
Lack of awareness of ICT importance	2.79*	1.02	2.59*	1.19
Inappropriate content of ICT message	2.34	1.03	2.41	1.15
Poor benefits in using ICT	2.08	0.11	2.17	1.20
I don't know where to get ICT facilities	1.94	1.12	2.02	1.13

*Serious (mean ≥ 2.50

Source: *Field Survey, 2022.*

Hypothesis testing

Table 4 shows that farmers had a mean of 0.226 while VEAs had a mean of 0.367. This gave a mean difference of 0.41. This signifies that there is a difference in the level of ICT use between VEAs and farmers. The result also shows a z-value of 7.78 which is higher than the critical z-value of 1.96. VEAs with a higher mean {0.367} than that of farmers {0.226} imply that VEAs use ICT more than farmers. Therefore, the hypothesis is rejected, and the alternative, which says that VEAs and farmers differ significantly in their level of use of ICT in extension service, is accepted.

Table 4:Test of difference in the level of ICT use between VEAs and farmers

Variable	*N*	ICT use (Mean)	Difference	Z-value
Farmers VEAs	180 300	0.226 0.367	0.41	7.78

*Significant at 5% level (critical z-value = 1.96).

Conclusion and Recommendation

The danger to the relevance of agricultural extension services in the modern world appears to be addressed by ICT and its immense potential in every area of human activity. ICT has the potential to significantly change the agricultural extension in developing nations like Nigeria if it is accepted and used appropriately. However, in order to do so, government, non-governmental organisations, and extension organisations will need to actively engage in ICT education, provide VEAs with ICT, and teach VEAs on how to utilise it. Given the significance of these ICT resources to extension services, ongoing access to them is necessary. It is essential for the government and non-governmental organisations (NGOs) to become involved in providing these ICT services and ensuring that VEAs and farmers get the training they need to become skilled and competent. The study recommended that the Federal Ministry of Agriculture and Rural Development organise adequate training for VEAs on the importance of ICT use in agricultural extension delivery to sensitise VEAs and farmers to increase their quest for knowledge and improved skills. This training should be done in conjunction with the state ADPs. Additionally, VEAs and farmers should have access to ICT facilities from both government and non-governmental organisations.

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