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ANALYSIS OF VILLAGE EXTENSION AGENTS' ACCESS AND USE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN THE DELIVERY OF EXTENSION SERVICES IN THE CENTRAL AGRICULTURAL ZONE OF PLATEAU STATE, NIGERIA

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ABSTRACT

This study examined village extension agent's access and use of information and communication technology in extension services delivery to farmers in Plateau State, Nigeria. The population for the study consisted of all the village extension agents (VEAs) of the Plateau Agricultural Development Program (PADP) in the central agricultural zone of the state. Multistage sampling technique was employed in selecting the respondents for the study. Primary data were collected through the administration of questionnaires and interview techniques and were analyzed using descriptive and inferential statistics. Findings from the study shows that majority (77%) of the sampled village extension agents (VEAs) were males with a mean age of 43 years, Majority (87%) of the respondents were married with a mean household size of 4 persons. The study also showed that majority (80%) of the VEAs had tertiary education with a mean working experience of 13 years and average monthly income of ₦64875. The result also shows that four (4) out of the seven (7) listed ICT facilities were adjudged the ICT facilities accessible to VEAs in the study area having had mean values above the discriminating index ($\bar{x}=2.50$). They included; GSM (phone) ($\bar{x}=3.94$), radio ($\bar{x}=2.83$), television ($\bar{x}=2.73$) and computer ($\bar{x}=2.68$). Based on 2.50 discriminating index, only two out of seven listed conventional ICT facilities had mean values above the discriminating index ($\bar{x}=2.50$) and thus were adjudged the ICT facilities used by VEAs. The GSM (phone) had the highest mean value of 3.62 followed by radio with mean value of 2.54. The logit regression result shows that coefficients of years of working experience and monthly income were significant and positively related to ICT use, while age and complexity in use of ICT were significant and negatively related to ICT use. Major constraints to use of ICT by VEAs includes; lack of administrative support in provision of ICT (87%), lack of in-service training on ICT use (66%), Poor salary/remuneration (64%), lack of awareness of ICT importance in extension (56%) among others. The study recommends intervention, serious synergy and proactive response on the part of government, non-governmental organization and extension organizations in ICT provision and training of VEAs on ICT use as well as stepping up campaigns on the importance of ICT use in agricultural extension delivery.

KEY WORDS

Village extension agents (VEA), access, information and communication technology (ICT), delivery, extension services.

Sustainable agricultural development cannot be achieved successfully without accurate and up-to-date information and technologies to cope with globalization and its simultaneous rapid technological changes. This is because information is important for the development of any society and success for human endeavor (Sokoya et al., 2014). According to Tiwari and Sharma (2015), information is considered the fifth human need after air, water, food and shelter. Therefore, the concept of agricultural information in general and in particular, as a source of development, is of great importance in the contemporary world and cannot be overemphasized (Ogbonna and Aguvu, 2013). There is hardly an area of human activity today that has not been touched by dramatic changes in information and communication

technologies (ICT). ICTs, in the broadest sense, are a set of tools, equipment, programs and services that are used to produce, capture, store, disseminate and exchange information (Raji, 2008). Ozor and Madukwe (2009) conceived ICT as a set of technologies that facilitate the processing, storage, retrieval and transmission of information. Information and communication technologies can be broadly defined as technologies that simplify communication, through the process and transmission of information through electronic media (Suleiman et al., 2015).

Adepetun (2012) sees ICT as an essential tool and essential spice for sustainable development, which has the potential to reduce poverty and improve livelihoods by providing timely knowledge to users, reducing transaction costs and improving productivity. Okeke *et al.*, (2015) confirmed that Nigeria today is rich in different forms of ICT devices that are used in different areas as it needs to deal with information explosions. Mukesh *et al.* (2010) divided ICT into three parts namely; first is broadcast technology-media which includes radio, projectors, media vans, newspapers, magazines, newsletters, leaflets. The second is printing technology which includes newspapers, magazines, newsletters etc. and finally telecommunication/computer technology which include global system and telephones, computers, fax and internet. Information and communication technologies have unique characteristics that allow them to be used in different ways than those used by traditional media for development. According to Agwu et al. (2008), compared to traditional media, ICT provides opportunities for two-way and horizontal communication and opens new channels of communication for rural communities and the intermediaries and development organizations that support them.

ICT increases the ability to search for information and exposes information seekers to diverse information which ultimately reduce uncertainty and broaden market participation. According to the CTA (2000), efficient information transmission is the key to bridging the gap between developed and underdeveloped countries. What to plant, when to plant, how to grow and harvest, where to store and sell, and at what price, depends on long-term knowledge, communication and information exchange. Meera *et al.* (2004) posited that the emerging new paradigm of agricultural development is calling into question the old ways of providing essential services to citizens as traditional societies are also becoming knowledge based societies around the world. As today's world population grows from 6.7 to 9.1 billion by 2050, food production will need to double over the same period (Tata and McNamara, 2016). Therefore, there is a need for more effective advisory services to address agricultural challenges, including meeting the information needs of poor smallholders in developing countries. In response, agricultural extension professionals and institutions around the world are promoting the use of information and communication technology (ICT) through agricultural extension and education agents.

Agricultural extension which relies heavily on the exchange of information between and among farmers is an area where ICT can have a significant impact. In many Sub-Saharan African countries conventional media such as radio, newspapers and television play a key role in rural development. It is through these media that agricultural innovations are disseminated to rural farmers. Unfortunately, extension agents in Nigeria still rely heavily on traditional methods of disseminating information (Orikpe and Orikpe, 2013). This is no longer effective for limited-time research discoveries and higher farmers-extension agent ratios in the new millennium. At the beginning of the State-wide Agricultural Development Program (ADPs) in 1980, the ratio of extension agents: farmers (EA: farmers) ranged from 1: 2000 to 1: 3000. This was expected to decrease from 1: 800 to 1: 1000 by the completion date of the project and the withdrawal of support from the World Bank (Adejo *et al.*, 2013). This goal was never achieved. Based on the results of the 2018 Agricultural Performance Survey (APS) conducted by NAERLS, which was presented to the public by the Minister of Agriculture and Rural Development, Audu Ogbeh, during the World Food Day celebrations on October 16, 2018, several states did not provide data about its farmers and extension agents. However, some few states provided information on farm families in 2018. They include Kano State which recorded the highest number of Village Extension Agents (VEA) of 1,118 followed by Plateau State with 467 VEAs. Ebonyi State recorded 103 VEAs, while Benue and Lagos

States recorded 27 and 6 VEAs respectively. The number of VEAs is largely insufficient to provide advisory services to farmers even as most states have not conducted a survey on agricultural resources in the past 20 years. With this number, the average farm families' ratio in the country stands at 1:5,000, against FAO's recommended 1:800. From the 2018 APS report, the desire to achieve a ratio of one EA to 1,000 farmers is very far from being a reality, as reports from all the states indicated very high EAs/farmers ratio. Thus, it can be seen that no matter how effective the provision of extension services through extension workers in villages may be, it can never be efficient and cost effective in a developing country like Nigeria with a projected population of over 200 million (National Population Commission, 2006), most of whom are employed in agriculture. Currently, the role of agricultural extension is somewhat in flux, and clouded by uncertainty as to how to meet the challenges of the new wave of information technology.

The inefficiency associated with traditional person-to-person information flow mechanisms, especially in the dissemination of extension messages, has led to the possibility of using ICT as a complementary tool. Meera *et al.* (2004) stated that as a result of the emergence of new paradigm of agricultural development, the old ways of providing vital services to citizens are being challenged. Traditional societies are also turning into scientific societies all over the world. However, these problems can be alleviated by the effective exploitation of innovative solutions that incorporate information and communication technologies in the dissemination of agricultural information. Meera *et al.* (2004) reiterate that ICT can be of great help by allowing extension workers to collect, store, retrieve and disseminate the extensive information they need, thus turning them from extension agents into knowledge based workers. The emergence of this knowledge based workers will result in the realization of bottom-up and demand-driven technology generation, assessment, refinement and technology transfer. The Training and Visiting (T&V) system practiced in Nigeria and other countries has traditionally been supported by ICT facilities such as mobile cinema, video, television, radio and telephone as the main ICT used by most extension workers. From the above, it is clear that some ICT facilities are widely available, but it is not very clear to what extent they are used by extension agents to affect the lives of farmers. Previous research studies have not brought a clear picture of the level of usage of ICT facilities by extension workers especially in Plateau state. According to Arinze *et al.* (2012), the impact of ICT use in extension delivery in Nigeria still remained minimal. This has resulted in a knowledge gap which needs to be filled. The urgent need for current agricultural knowledge and information system by farmers calls for the adoption of information and communication technologies (ICTs) by extension workers to transmit relevant information to farmers in a most efficient way. The broad objective of the study is to examine village extension agents' access and use of information and communication technology in extension services delivery in Plateau State, Nigeria. The specific objectives were to; describe the socio-economic characteristics of the village extension agents (VEAs) in the study area, assess the level of access of VEAs to ICT facilities in the study area, ascertain the level of use of ICT facilities by the VEAs in extension services delivery, determine the factors influencing the use of ICTs by the VEAs and identify the constraints to the use of ICT facilities by VEAs.

The following null hypothesis shall be tested thus:

- H_0 : There is no significant relationship between the socio-economic characteristics of VEAs and their level of use of ICT.

MATERIALS AND METHODS OF RESEARCH

The study was carried out in Plateau State, located in north central region of the country referred to as the Middle Belt. The state was created in February 1976 when it was carved out of Benue-Plateau State. The state lies between latitudes 8°N and 10°N and longitude 7°E and 11°E of the prime meridian (GTZ, 2010). The state has a population of 3,206,531 based on the 2006 Census (NBS, 2009). The projected population by 2019 stands at 4614434 people going by a population growth rate of 2.8% per annum. The state shares

common boundaries with Kaduna and Bauchi States to the North, Benue State to the South, Taraba State to the East and Nasarawa State to the West. The State has 17 Local Government Areas and three senatorial Zones. The senatorial zones are: Plateau North, Plateau Central and Plateau South Senatorial Zones. The altitude ranges from around 1,200 meters (about 4000 feet) to a peak of 1,829 meters above sea level in the Shere Hills range near Jos. Though situated in the tropical zone, a higher altitude means that Plateau State has a near temperate climate with an average temperature of between 18 and 22°C. Harmattan winds cause the coldest weather between December and February. The warmest temperature usually occurs in the dry season months of March and April. The highest rainfall is recorded during the wet season months of July and August. With 70% of the population being rural dwellers, it is not surprising that 68% of the workforce is involved in agriculture.

The population for the study consisted of all the village extension agents (VEAs) of the Plateau Agricultural Development Program (PADP) in the central agricultural zone of the state. A two stage sampling technique was used in selecting the respondents for the study. The first stage involved the purposive selection of Plateau central agricultural zone for the study. The central zone consists of Mangu, Bokkos, Pankshin, Kanke and Kanam Local Government Areas (LGAs) with headquarters in Mangu. In the second and final stage, all the 172 village extension agents (VEAs) available in Plateau central agricultural zone were selected for the study. They includes; 50 VEAs from Mangu, 32 from Bokkos, 43 from Pankshin, 28 from Kanke and 19 from Kanam Local Government Areas. The decision to use 100% of the extension agents in the selected zone was due to the few number of village extension agents in the zone.

Data for this study was garnered from primary sources. This was achieved through the use of questionnaire structured to capture and elicit information from the respondents based on the objectives and hypotheses of the study. Data for this study was analyzed using descriptive statistical tools such as frequency distribution, percentages, mean score, four point Likert type scale as well as binary logit regression.

The logit regression model is a unit or multivariate technique which allows for estimating the probability that an event occurs or not by predicting a binary dependent outcome from a set of independent variables. The logit model is based on cumulative logistic probability function and it is computationally tractable. According to Gujarati and Porter (2009), it is expressed as (1):

$$P_i = E(Y = 1|X_i) = B_1 + B_2X_2 + B_3X_3 \dots \dots B_nX_n$$

For ease of estimation, equation (1) is further expressed as (2):

$$P_i = \frac{1}{1 + e^{-Z_i}} = \frac{e^{-Z_i}}{1 + e^{-Z_i}}$$

Where: P_i = probability of an event occurring; $P_i = B_1 + B_2 X_i$.

The empirical model of the logistic regression for study assumed that the probability of the farmers' participation in Agricultural insurance scheme is expressed as (3):

$$P_i = \frac{e^{b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9}}{1 + e^{b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9}}$$

P_i ranges between zero and one and it is non-linearly related to Z_i , Z_i is the stimulus index which ranges from minus infinity to plus infinity and it is expressed as (4):

$$Z_i = \ln \left(\frac{P_i}{1 - P_i} \right) = b_0 + b_1X_1 + b_2X_2 \dots + b_9X_9 + u$$

To obtain the value of Z_i , the likelihood of observing the sample was formed by introducing a dichotomous response variable. The explicit logit model was expressed as (5):

$$Y = b_0 + b_1X_1 + b_2X_2 \dots + b_9X_9 + u$$

Where:

Y = Pooled index of level of use of ICT by the respondents (Mean index of 2.5 and above = used ICT, index below 2.5 = not used ICT);

X_1 = Age of VEAs (Years);

X_2 = Sex (Dummy variable, male = 1, female = 2);

X_3 = Marital status (Dummy variable, single = 0, married = 1);

X_4 = Educational level of farmers (Years of formal education);

X_5 = Household size (number of persons);

X_6 = Working experience (Years);

X_7 = Monthly income (Naira);

X_8 = Perception of cost of ICT facilities (1 if high, 0 if otherwise);

X_9 = Complexity in use of ICT (1 if complex, 0 if otherwise);

$b_1 - b_9$ = Coefficients to be estimated;

b_0 = Constant term;

u = error term.

RESULTS AND DISCUSSION

Socio-economic characteristics of village extension agents (VEAs). The socio-economic characteristics of the village extension agents (VEAs) are presented in Table 1. The result showed that 43.0% of the VEAs were between the ages of 41 – 50 years. 32.0% fell within the age group 31 – 40 years. Those above 50 years were next with 19% while 6% of the respondents fell within the age range of 21- 30 years of age. The mean age of the VEAs was 43 years. This shows that most of the extension agents are in their economically active and productive ages, hence there is high prospect for ICT usage as they will be able to respond and meet the needs of farmers using variety of communication strategies. This result confirmed the findings of Tologbonse *et al.*(2011) and Asadu *et al.*(2013) that a greater proportion of village extension agents (VEAs) were within the age range of 41 – 50 years in Niger and Imo States respectively. The result in Table 1 shows that majority (77%) of the sampled village extension agents (VEAs) in the study area are largely males while only (23%) are females. This shows that male VEAs dominate the extension scheme of the ADP system. This agrees with the findings of Adedoyin *et al.* (1999) that male dominate the workforce in Nigeria's agricultural sector. The dominance of male VEAs could be adduced to the traditional consideration in favor of the male child in almost every facet of the society. Thus, most extension agencies see the male VEAs as utility and valuable workers who can go the extra mile without cultural inhibition. This possibly favors their employment. The result further shows that 87% Of the respondents are married while 13 % are single. This simply implies that most of these VEAs were responsible and had a family to maintain. It should be noted that the basic needs of the family will take priority position in the family budget before ICT will be considered. This finding collaborates the work of Yakubu *et al.*, (2013) who in their study on use of information and communication technologies among extension agents in Kano state, Nigeria reported that the entire (100%) agricultural extension agents in the area were married implying that most of them are responsible and would be committed to their duties providing reliable and useful information to farmers in the course of their extension service delivery.

The result also shows that 57% of the VEAs in the study area had a household size of 4-7 persons, 39% had 1-3 persons while 4% of the household had more than 7 persons. The mean household size of respondents in the study area was 4 persons. This means that the household size of the extension agents was relatively small. The high literacy level of the

VEAs and the current economic crunch in the country may be responsible for the modest family size.

Table 1 – Distribution of Respondents Based on their Socio-economic Characteristics (n=172)

Variable	Frequency	Percentage	Mean
Age (years)			
21- 30	11	6.0	
31- 40	55	32.0	
41 – 50	74	43.0	
50 above	32	19.0	43.0
Sex			
Male	132	77.0	
Female	40	23.0	
Marital status			
Single	150	87.0	
Married	22	13.0	
Educational level			
Primary	-	-	
Secondary	-	-	
Tertiary	138	80	
Post graduate	34	20	
Household size (number)			
1-3	67	39.0	
4-7	98	57.0	
>7	7	4.0	4
Years of work experience			
< 5	45	26.0	
6-10	36	21.0	
11-15	31	18.0	
16-20	24	14.0	
21-25	21	12.0	
>25	15	9.0	13
Annual farm income (Naira)			
20,000- 40,000	25	15.0	
41,000-60,000	33	19.0	
61,000-80,000	62	36.0	
81,000-100,000	35	20.0	
>100,000	17	10.0	64875

Source: Field survey, 2021.

It is important to note that a large family size may predispose increased consumption. The fund which would have been used to purchase ICT facilities could be consumed in a bid to meet up with the household needs for food, clothing, healthcare etc. However, the modest household size could invariably be an advantage to ICT usage if the income is adequate because the cost of maintaining the family may not be very high. Majority (80%) of the VEAs had tertiary education while the remaining 20 % of the VEAs had post graduate education. This was expected as the study location is an urban area with high literacy level. The educational level of any extension agent determines the quality of his skill, his cognitive abilities, technical competence and shows how well and appropriate technological innovation can be transferred to farmers. Education has been identified as a catalyst in agriculture and other productive activities because it broadens the mental horizon, influences the totality of the mind and predisposes individuals to new ideas (Ndaghu, 2011). Adequate education therefore could enhance agricultural extension agents' understanding of use of ICTs and sources of information on improved innovation for agricultural practices. The result shows that 26% of the VEAs had less than 5 years working experience, 21% had between 6 – 10 years working experience while 18% had between 11 – 15 years working experience. Also, 14% had between 16 – 20 years working experience, 12% had between 21 – 25 years working experience while 9% had more than 25 years of working experience. The mean number of years of working experience was 13 years. The result implies that the VEAs had

reasonable years of working experience. The VEAs by their reasonable years of working experience could be placed on better pedestal to access and use ICT facilities. The length of time in the job would make it easier for them to analyze the use and potentials of the facilities in extension service delivery. The study of Tologbonse *et al* (2011) and Asadu *et al* (2013) also confirmed reasonable years of experience of VEAs as a catalyst in effective dissemination of different agricultural innovations and ICT usage. On the monthly income of the VEAs, the result shows that 36% of the VEAs earn between ₦61,000 – ₦80,000 monthly, 20% earn between ₦81,000-100,000, 19% earn between ₦41,000-60,000, 15% earn between ₦20,000-40,000 while 10% earn above ₦100,000. The mean monthly income of VEAs in the study area was ₦64875. Based on the average monthly income, it could be difficult for VEAs to obtain some of the ICT facilities on their own after taking care of the basic/physiological needs. This therefore makes government intervention imperative. In this regard, capacity building Programs have become necessary for increased skills and knowledge and subvention for free distribution of these facilities by government to them is essential.

Accessibility of ICT Facilities by VEAs. The result in Table 2 shows the accessibility of ICT facilities to VEAs. Based on 2.50 discriminating index, four (4) out of the seven (7) listed ICT facilities had mean values above the discriminating index ($\bar{x}=2.50$) and thus were adjudged the ICT facilities accessible to VEAs in the study area. The GSM (phone) had the highest mean value of 3.94 with a standard deviation of 0.23. This was followed by radio with a mean value of 2.83 and standard deviation of 0.77, Tv with mean value of 2.73 and standard deviation of 1.33 and lastly computer with a mean value of 2.68 and standard deviation of 1.01. The facilities whose mean score were below the discriminating index ($\bar{x}=2.50$) included mobile cinema ($\bar{x}= 2.44$), projector ($\bar{x}= 2.20$) and bulletin ($\bar{x}= 1.97$). Supporting the above findings, Adejo and Haruna (2009) observed that rural people have access to ICTs in the decreasing order of phone (GSM), radio, television and computer. The result also confirmed a recent development in Nigeria which shows that GSM is more accessible to the rural people than television owing to the deregulation of the GSM service provision and proliferation of service providers (Adejo *et al.*, 2013). Also confirming the findings, Tologbonse *et al* (2011) observed that GSM (phone), radio, television, video and computer are major ICT facilities available to VEAs.

Table 2 – Mean Rating of VEAs by Accessibility of ICT facilities for Extension Work. (N=172)

ICT facilities	VA (4) %	A (3) %	SA (2)	NA (1)	Mean	STD Dev
Radio	38(22.0)	70(41.0)	62(36.0)	2(1.0)	2.83	0.77
GSM (Phone)	162(94.0)	10(6.0)	–	–	3.94	0.23
Computer	50(29.0)	37(22.0)	65(38.0)	20(12.0)	2.68	1.01
Mobile cinema	22(13.0)	72(41.8)	39(22.6)	39(22.6)	2.44	0.98
TV	81(47.0)	18(10.4)	19(11.0)	54(31.3)	2.73	1.33
Bulletin	9(5.2)	43(25.0)	54(31.3)	66(38.3)	1.97	0.92
Projector	5(3.0)	47(27.0)	98(57.0)	22(13.0)	2.20	0.69

Note: VA= Very Accessible, A= Accessible, SA= Scarcely Accessible & NA= Not Accessible.

Level of Use of ICT Facilities. The result in Table 3 shows the VEAs level of ICT use. Based on 2.50 discriminating index, only two (2) out of seven (7) listed conventional ICT facilities had mean values above the discriminating index ($\bar{x}=2.50$) and thus were adjudged the ICT facilities the VEAs used. The GSM (phone) had the highest mean value of 3.62 with a standard deviation of 0.72. This was followed by radio with mean value of 2.54 and standard deviation of 0.97. The facilities whose mean scores were below the discriminating index included TV ($\bar{x}= 1.93$), computer ($\bar{x}= 1.62$), mobile cinema ($\bar{x}= 1.22$), bulletin ($\bar{x}= 2.11$) and projector ($\bar{x}= 1.83$). This result indicates that VEAs' use of ICT facilities was low. It was

discovered from personal interview with extension agents in the study area that, the State ADP had no functional ICT unit and internet facility in their office complex. This could be adduced to be responsible for the limited use of some of these ICT facilities by VEAs. Most of the VEAs noted that the poor level of use of ICT facilities is attributable to the lack of administrative support in provision of ICT and low or non-inclusion of ICT in their pre-service training. The study by Adejo and Haruna (2009), Asadu *et al* (2013) and Adejo *et al.* (2013) also confirmed that GSM (phone), radio, television and computer are the major ICT facilities used by extension workers across Nigeria. However, extension agents need to go beyond the use of these known ICT facilities to the other ICT facilities whose use were found to be limited. In India, extension workers and rural farmers now use internet, website and their personal e-mail account to access and gather technical information from various research sources to improve their production capacity (Sharma, 2007). It should be noted that agricultural extension service which involved teaching, research and the transfer of new farming technologies and information to farmers and feedback from farmers is one major area where ICT can cause a major noticeable turnaround. According to Wahab *et al* (2013) who assessed the geographic information system for sustainable agricultural extension service, extension personnel and farmers can use the GIS in weather prediction that will eventually improve agricultural production and monitor market trends. Babalola (2010) noted that GIS can be used to monitor farmers' activities in rural areas.

Table 3 – Mean Rating of Level of Use of ICT facilities by VEAs for Extension Work (N=172)

ICT facilities	VO (4)	O (3)	S (2)	N (1)	Mean ($\bar{x}$)	STD Dev
Radio	31(12.0)	64(34.0)	44(31.0)	33(23.0)	2.54	0.97
GSM (Phone)	129(75.0)	24(14.0)	15(9.0)	3(2.0)	3.62	0.72
Television	8(5.0)	22(13.0)	91(53.0)	50(29.0)	1.93	0.77
Computer	1(0.5)	6(3.0)	92(53.0)	72(42.0)	1.62	0.58
Mobile cinema _		12(7.0)	48(28.0)	111(64.5)	1.22	0.62
Bulletin	3(2.0)	44(53.0)	92(53.0)	32(19.0)	2.11	0.71
Projector	_	28(16.0)	84(49.0)	59(34.0)	1.83	0.69

Note: VO= Very often, O= Often, S= Sometimes & N= Never used.

Factors Influencing the Use of ICT by VEAs. Table 4 shows the regression analysis of the socio-economic and institutional factors that influence ICT use by VEAs. The coefficients of years of working experience and monthly income were significant and positively related to ICT use, while age and complexity in use of ICT were significant, but negatively related to ICT use.

Age (X_1) was significant and negatively related to ICT use at 10% level of probability. This means that any increase in age of the VEAs would causes a decrease in ICT use. Advancement in age may lead to lack of interest caused by long hours of working with the computer. The drive for the use of ICT facilities could be lower with decreasing age. This confirmed the findings of Asadu *et al.* (2013) in a study on communication techniques used by extension workers. They observed that extension workers in their active age are able to respond and meet the needs of farmers using variety of communication strategy.

Years of working experience (X_6) was significant at 5% level of probability and positively related to ICT use. It implies that as the respondents increase in working experience (skill and knowledge), their ICT use would increase. Thus the respondents'

practical knowledge and exposure to ICT- based facilities is enhanced. The accumulation of research knowledge and skill will help them become active researchers and learners. The study by Tologbonse *et al* (2011) also confirmed reasonable years of experience of VEAs as a better pedestal for the adoption of ICT in extension service delivery.

On monthly income (X_7), it was found to be a positively significant factor influencing ICT usage by the respondents. By implication, it means the more income the respondents earn, the higher the tendency for them to utilize ICT. The significant relationship between income and the use of ICT facilities implies that the higher the income, the higher the likelihood of using ICT facilities. This could also mean a high motivation for VEAs to seek for other ICT facilities that were not available but could aid their service delivery.

The coefficient for complexity in use of ICT (X_9) was significant but negatively related to use of ICT. By implication, it means the more the VEAs perceives complexity in use of ICT, the lower the tendency for them to utilize ICT. The significant relationship between complexity in use of ICT and the use of ICT facilities implies that the higher the complexity, the lower the likelihood of using ICT facilities.

Table 4 – Logit regression estimates of factors influencing use of ICT by VEAs

Variable	Coeff.	Std. Err.	z	P> z
Constant	-1.284	12.672	-0.10	0.919
Age	-6.487	3.865	-1.68*	0.093
Sex	-.179	.428	-0.42	0.675
Marital status	.390	.626	0.62	0.532
Educational status	2.998	5.357	0.56	0.576
Household size	-.284	1.320	-0.22	0.830
Working experience	3.736	1.628	2.30**	0.022
Monthly income	2.049	.604	3.39***	0.001
Cost of ICT facilities	1.103	1.788	0.62	0.537
Complexity in use of ICT	-1.794	.589	-3.04***	0.002
Log likelihood = -71.826				
Pseudo R ² = 0.101				
LR chi2(9) = 22.53				
Prob> chi2 = 0.0074				
No. of Observations = 172				

Note: *, **and***=Significant at 10%, 5% and 1% probability levels respectively.

Test of Hypothesis. Result of the logit regression in Table 4 reveals that three of the socio-economic variables; age, years of working experience and monthly income were found to have significant relationship with ICT use by VEAs. This goes to show that these variables have a significant effect on the level of use of ICT by VEAs. We therefore reject the null hypothesis and accept the alternative hypothesis, thereby concluding that, there is significant relationship between the socio-economic characteristics of VEAs and their level of use of ICT.

Constraint to Use of ICT Facilities. The constraints to VEAs use of ICTs are presented in Table 5. The results shows that lack of administrative support in provision of ICT ranked first with 87% followed by lack of in-service training on ICT use (66%), Poor salary/remuneration (64%), lack of awareness of ICT importance in extension (56%), complexity in the use of ICT (45%), erratic and fluctuating power supply (42%), non-accessibility of some ICT facilities (27%), lack of internet access in rural areas (22%) and poor communication network (10%).

Supporting the above findings, Asadu *et al.* (2013) observed that illiteracy among farmers, limited power supply, high cost of modern communication techniques, 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. Asadu *et al.* (2013) opined that these constraints are more serious in rural areas. The use of GSM (phone), computer and television is common but it is also constrained by limited network coverage, poor connectivity and poor power supply.

Adebowale (2009) opined that poverty and low computer literacy constitute major challenges to the use of modern communication techniques in agricultural extension delivery services in Nigeria. Poor remuneration of VEAs could constitute a serious limitation to ICT use. VEAs with a mean monthly income of N64, 000 may not be able to fund ICT usage. The use of ICT facilities for research and extension communication remains low because research and extension organizations seem not to be fully ICT ready. Extension organizations do not provide ICT facilities in their offices. This calls for government and non-governmental organizations (NGOs) intervention in providing ICT facilities for VEAs and ensuring increased skills and competence through training.

Table 5 – Constraints to use of ICT facilities by VEAs for Extension Work (N=172)

Constraints	Frequency	Percentage	Rank
Poor salary/remuneration	111	64.0	3 rd
Lack of awareness of ICT importance	97	56.0	4 th
Complexity in using ICT	77	45.0	5 th
Non accessibility of some ICT facilities	46	27.0	7 th
Lack of internet access in rural areas	38	22.0	8 th
Poor/no communication network	17	10.0	9 th
Lack of in-service training on ICT use	115	66.0	2 nd
Lack of administrative support in provision of ICT	150	87.0	1 st
Erratic and fluctuating power supply	73	42.0	6 th
Perception of cost of ICT facilities	11	6.0	10 th

Note: Multiple responses.

CONCLUSION AND RECOMMENDATIONS

This study examined the village extension agent's access and use of information and communication technology in extension services delivery to farmers in Plateau State, Nigeria.

The study revealed that majority of the farmers were middle aged and active, married and had formal education. They had many years of working experience. The study revealed that accessibility and use of ICT facilities by VEAs in the study area was very low. The ICT facilities accessible to VEAs includes; GSM (phone), radio, television (TV) and computer. The ICT facilities adjudged to be used by VEAs were the GSM (phone) and radio. The logit regression result of factors influencing use of ICT by VEAs shows that coefficients of years of working experience, monthly income, age and complexity in use of ICT were significant and related to ICT use at various levels of probabilities. Major constraints to use of ICT by VEAs includes; lack of administrative support in provision of ICT, lack of in-service training on ICT use, Poor salary/remuneration, lack of awareness of ICT importance in extension, complexity in the use of ICT, erratic and fluctuating power supply, non-accessibility of some ICT facilities, lack of internet access in rural areas and poor communication network. The following recommendations were made based on the findings from the study:

- The Federal Ministry of Agriculture and Rural Development in conjunction with the state ADPs should mount education campaigns on the importance of ICT use in agricultural extension delivery to sensitize VEAs and increase their quest for knowledge and improved skills;
- The states' Agricultural Development Program should provide training and development opportunities on ICT use to increase the knowledge, skills and competence of VEAs in the use;
- The pre-service training curriculum of prospective VEAs should be enriched with ICT to prepare them for the world of work in the extension service;
- As a matter of policy, each state ADP should have a functional ICT center containing relevant facilities to extension service. Also, NGOs in their intervention could provide some or all of the facilities to keep extension work on course.

CONFLICT OF INTERESTS

The authors have declared no conflict of interest.

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