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Socio-Economic Factors Influencing Access and Utilization of Information and Communication Technology (ICT) among Extension Agents in South East, Nigeria

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Abstract

Information and Communication Technologies (ICT) usage in Nigeria has come a long way but despite its existence, there seems to exist limited access and utilization of the technologies among extension agents in south-east Nigeria. Consequent upon this, the study assessed socio-economic factors influencing access and utilization of information and communication technology (ICT) among extension agents in extension service delivery in South East Nigeria. Multi-stage sampling technique was employed in selection of 120 Extension Agents used for the study. Primary data were collected with the aid of a well-structured questionnaire. Analyses of data were by descriptive and inferential. The result of the analysis showed that 61.67 % of the extension agents were males, who were married (78.33%) with average household size of 2 persons respectively. The result of multiple regression analysis indicated that gender, educational attainment, family size, income level, membership of cooperative society and working experience were positive signed and significant in the utilization of ICT facilities among extension agents. However, educational attainment, income level, membership of social organisation, working experience, and distance from place of ICTs were positive signed and significant in the access of ICT facilities among extension agents. The R^2 of 69.4% was obtained for access to ICTs while 69.6% was recorded for utilization of ICTs by EAs. The result of factor analysis showed that infrastructural, technical and socio-economic factors constrain access and utilization of ICTs by extension agents. Based on the findings the study recommended the strengthening of the use of contemporary ICTs (phones, internet, etc.) rather than conventional ICTs such as radio and television, provision of adequate training on the use of ICTs by extension agents and other agricultural stakeholders.

Keywords: ICT, Constraints, Access, Utilization, Extension Agents

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Introduction

Agricultural development in Nigeria has been hampered by low level of agricultural information exchange. Arokoyo (2003) reports that the national extension service is based on the Training and Visit (T & V) extension system; traditionally supported by mobile cinema, video, television, radio and telephone being the only ICTs used by majority of extension workers. In the last two decades, the world has witnessed an unprecedented growth in the area of ICT (Hosseini, Niknami and Chizari, 2009a). But in spite of the rapid improvement in information and communication technologies orchestrated by revolution in science and technology, most of the extension workers in Nigeria and the South East zone in particular, still rely on the T & V system. Majority of the Nigerian population are living in rural areas where they hardly have access to agricultural information (Hosseini, Niknami and Nejad, 2009b). The use of conventional communication channels such as farm/home visit, personal letters, and use of contact farmers, for disseminating agricultural information have been counterproductive. This calls for the adoption of ICTs by both researchers and extension workers to transmit relevant information to farmers in a most efficient way (Salau and Saingbe, 2008).

The efficiency with which these information and practices are conveyed to farmers to a large extent would determine the level of agricultural productivity. Extension organisations have been concerned with what should be the appropriate means and approaches in getting the right agricultural information to the end-users (farmers). In recent times however, there has been revolution with regards to Information and Communication Technology (ICT) in agriculture and particularly in extension service delivery of Nigeria. This revolution is an intervention with the potential to ensure that knowledge and information on important agricultural technologies, methods and practices are put into right use by farmers. The use of ICT provides an important platform for actualizing this. ICTs consist of various collections of resources and technical tools that are used for connecting, spreading, storing and managing information (Pigato, 2004).

ICT therefore, represents the collection of hardware and software that is used for producing, preparing, transferring and storing data via devices such as computers, radios, televisions, etc., and it includes an extensive scope of traditional and modern media (Norad, 2002). Information and communication technology have become an increasingly powerful tool for improving the delivery of basic services and enhancing local development opportunities. Today, a new paradigm of agricultural development is fast emerging in both developing and developed countries. The overall development of rural areas is expanding in new directions; old ways of delivering important information services to citizens are being challenged; and traditional societies are being transformed into knowledge-based societies' world over (Meera, Jhouwtani and Rao, 2004). Nigerian government in recognition of the importance of ICT in extension service delivery, has established policies and projects among which were; liberalisation and privatisation policies to encourage private sector participation and attraction of foreign investment into the telecommunication sector, which consequently reduces the price of computers and other ICT equipments, making them more accessible. There was also the launching of the global system of mobile (GSM) communication, making phone lines more accessible nationwide and the establishment of internet cyber cafes in all the major urban areas in the country, though the rates are still high and service unsteady (Ezeh, 2013). Very important also was the establishment of Information and Communication Support (ICS - Nigeria) in 2002, for agricultural growth (Oladimeji, 2004). This project though still on pilot phase in 8 States of the country (and in Abia State in the South-East) is aimed at establishing resource centres in rural areas, which makes information available to farmers and farm assistance organisations (ADPs, NGOs, Researchers, NAERLS etc.) at different centres and farm levels, as well as modernising their information base through the use of ICTs, such as telephone, radio, television, compact disk, read only memory (CD-ROM) internets etc. (Arokoyo, 2005). Apart from facilitating the acquisition and absorption of information/knowledge networking, codification, tele-working and science system, ICT could be used to access global knowledge and communication with other people.

Information and Communication Technologies (ICT) usage in Nigeria has come a long way but despite its existence, there seems to exist limited access and utilisation of the technologies among extension agents in south-east Nigeria. Presently, it is still quite unclear whether the agricultural extension agents in the South-east States of Nigeria are adequately exposed to information and communication technology. In view of this therefore, it has become imperative to investigate socio-economic factors influencing access and utilization of information communication technology (ICT) among extension agents in South East, Nigeria. The objectives of this study were to describe the socio-economic and personal characteristics of the extension agents in Southeast Nigeria in relation to utilization of ICT, determine the influence of extension agents' socio-economic characteristics on their access and utilization of selected ICT facilities and identify and analyse the constraints to effective use of ICTs for extension service delivery among extension agents in the study area.

Materials and Methods

This study area is South-East Nigeria; which comprises of five States namely; Anambra, Abia, Ebonyi, Enugu and Imo States. The area has an approximated land area of 5824.7 sq.km and lies between longitude 6°50' and 8°15'E and latitudes of 4°30' and 7°15'N (Mamman, 2000). The South-East States have about a total of 16,381,729 people (NPC, 2006) who are mainly of Igbo tribe. The vegetation lies within the rain forest and dry savannah region of Nigeria. It has a tropical humid climate with two distinct seasons of the year namely, the rainy and dry seasons. The rainy season last from April to October and is marked by regular drop in ambient temperature. The dry season lasts from November to March. It is characterized by a hot dry spell. Within the two seasons, the temperature range varies from about 18°C to 34°C. Dominant arable crops of the area include yam, rice, cassava, maize, cocoyam, groundnut, pepper and various types of vegetables. Oil palm, banana, plantain and coconut are plantation crops dominant in the area. Small ruminant and backyard poultry production dominate the livestock industry and fisheries.

A multistage random sampling technique was employed. In the first stage, three (3) States out of the five (5) states making the South-east Nigeria states were randomly selected. These States included: Abia, Ebonyi, and Enugu. The sample frame included all the ADP extension workers in the selected States. Secondly, from the three (3) selected States, two agricultural zones were randomly selected from each of the States as follows; in Abia State – Abia North and Abia South zones were randomly selected. In Ebonyi State – Ebonyi North and Ebonyi Central zones were randomly selected, while in Enugu state, Enugu East and Enugu North zones were randomly selected. Thus, a total of six (6) agricultural zones were selected for the study. From the six (6) selected zones, one hundred and twenty (120) extension agents serving in ADPs were randomly selected out of 269 EAs in the selected agricultural zones as in Table 1. The selection was done proportionately according to the population of EAs as follows: Ebonyi North 25 EAs, Ebonyi Central 24 EAs, Enugu East 18 EAs, Enugu North 9 EAs, Abia Central 22 EAs, Abia North 22 EAs, giving a total of 120 EAs.

The study was carried out using primary and secondary data sources. Data were obtained primarily using questionnaires which were directed to the extension agents. A section of the questionnaires each contain a checklist of identified technologies. The instruments were pre-tested and validated before data collection. The secondary data were collected from already written literatures, government publications, ADP annual reports, journals etc. The data for this study were analyzed using both descriptive and inferential analytical methods.

Results and Discussion

The result of the socio-economic characteristics of the extension agents indicates that majority (61.67%) were males while 38.33% were females. The predominance of extension service by male has serious implication for technology development and transfer. This Salau and Saingbe, (2008) noted that such gender disparity in extension service will lead to gender bias in technology development and transfer. The age of the respondents shows that majority (43.33%) were between 40-49 years, while few (1.67%) fell within age bracket of 60-69 years. However, the mean age of the extension agents was 40 years. This indicates that the extension agents are within their middle age and justifies the findings of Yakubu, *et al.*, (2013) who reported mean age of 42 years among extension agents in North West zone of Nigeria. Also, majority (78.33%) of the extension agents were married while very few (5%) were divorced. This collaborate the findings of Yakubu, *et al.*, (2013), who reported that 89.8% of extension agent in North West Nigeria were married with family responsibilities. Furthermore, analysis revealed that majority (85%) attended post secondary education while only 5% completed primary education. This is similar to the findings of Ezech, (2013), who observed that such educational qualification among extension agents is a requisite needed to aid the application of ICTs in extension service delivery. The monthly income of most (50%) of the extension agents ranged between ₦ 21,000 - ₦ 40,000 while few (1.67%) earned between ₦81,000 – ₦100,000. Similar finding was reported by Yakubu, *et al.*, (2013) among extension agents in North West Nigeria. The result also showed that greater proportion (68.33%) of the extension agents belonged to social organizations while few (31.67%) did not belong to any organization. Most of the respondents (70.12%) belonged to multi-purpose cooperative organizations and least (3.33%) were engaged in agro-input marketing. They membership of social organizations provide an avenue for interactions and exchanges of ideas and knowledge on ICTs operation and utilization. The mean distance covered by the extension agents to ICTs source was 3.32km.

The result of analysis on the influence of socio-economic characteristics of extension agents on their level of access to ICT facilities in the study area showed that the multiple regression co-efficient (R) was 0.771 or 77.1%. This showed that the included independent variables (age, sex, income, education, household size, cooperative society membership and distance from place of ICTs) were highly correlated with the extension agent's level of access to ICTs. The co-efficient of determination (R^2) was 0.694 or 69.4%. This means that about 69.4% change in the dependent variable was caused by variations in independent variables included in the regression model. This is an indication that the socio-economic characteristics of the extension agents exert a great influence on their level of access to ICT facilities in the area. The explanatory variables – age, sex, educational attainment, income level, membership of social organization, working experience and distance from place of ICTs were all positively signed, implying that increase in these variables will lead to increase in level of access to ICTs among extension agents.

Sex, household size, income level, working experience and distance from place of ICTs showed statistical significance at 1%. This signifies that these variables were positively associated with the extension agents' level of access to ICTs in the area. However, household size of the extension agents was negatively signed but statistically significant at 1%, implying an inverse relationship between household size and extension agents level of access to ICT facilities in the area, while the significance indicates that household size is positively associated with agents' level of access. The fitness of the model was further confirmed by the value of F-ratio (20.28) and the low value of Durbin Watson (1.786), implying absent of autocorrelation in the regression model. This justifies the findings of Isiaka *et al.* (2009) who reported a significant relationship between the extension workers' selected socio-economic characteristics and level of access to ICT for improved extension service delivery at $p < 0.05$ level. This finding was collaborated by Adesope *et al.* (2005), who reported that extension workers' level of education, professional rank and working experience are significantly related to their access to ICT for improving extension service delivery in Lagos and Ogun states.

The final regression equation is shown as:

The result of analysis on the influence of socio-economic characteristics of extension agents on their level of utilization of ICT facilities in the study area showed that the multiple regression co-efficient (R) was 0.834 or 83%. This shows that the included independent variables (age, sex, income, education, family size and cooperative society membership) were highly correlated with the extension agent's use of ICTs. The co-efficient of determination (R^2) was 69.6%. This means that about 69.6% change in the dependent variable was caused by variations in independent

variables included in the regression model. The variables; age, sex, educational attainment, family size, income level, membership of social organization, working experience and presence of ICT associated infrastructure e.g. electricity were positively signed. This showed that the socio-economic characteristics of the extension agents exert a great influence on their level of utilization of ICT facilities in the study area. Age, sex, education, family size, income level, membership of social organization were statistically significant at 10%, while presence of associated ICT infrastructure e.g. electricity was very highly significant statistically at 1%. This implies that these variables were positively associated with extension agents' level of utilization of ICTs in the area. This is in line with the findings of Tanko and Nwachukwu (2013) who observed that there is significant and positive relationship between ICT utilization and age, personal income and availability of ICT facilities. Similar finding was reported by Salau and Salingbe (2008) who noted that level of education and working experience were significantly related to the level of utilization of ICTs among extension workers in Nasarawa state, Nigeria.

The final regression equation is shown as:

From the data obtained from field survey, three (3) major constraints were extracted based on the responses supplied by the extension agents interviewed. Variables that loaded lower than 0.3 were not considered. From the analysis, the constraining variables were grouped into three (3): infrastructural, technical and socio-economic constraints as shown in Table 5.

Constraint I was identified as infrastructural constraint due to those variables that loaded high under it. These are: Vo1 – inadequate /lack of electricity (0.353), Vo8 – poor/lack of network coverage (0.685), Vo10 – gender discrimination (0.786) and Vo11 – poor telephone line (0.665). Constraint II was named technical constraints because the variables that loaded high under it were closely related to technical issues. These were: Vo8-poor/lack of network coverage (0.586), Vo9-poor electricity power supply (0.622), and Vo14 – maintenance problems (0.327). Constraint III was named socio-economic problem due to the high loaded variables under it. These are: Vo12 – poor access to credit (0.533) and Vo15-high taxes (0.421). Thus, infrastructural, technical and socio-economic constraints limit extension agents' access and use of ICTs for extension service delivery in the study area. This implies that these factors constitute great barrier to access and utilization of ICTs for extension service delivery in the study area. This justifies the findings of Yakubu et al (2013) who reported that the entire extension workers (100%) indicated poor ICT infrastructural development, erratic and unstable power supply as constraints to ICT use. The study also agreed with that of Arokoyo (2003) who observes that the utilization of ICTs in agriculture are constrained among other problems by inadequate infrastructure, limited human resource capacity, absence of national policies and low ICTs literacy. Arokoyo (2005) also states that the major constraints affecting the use of ICTs are erratic and unstable power supply, difficulty in connectivity, low level readiness of research and extension organizations to embrace the use of ICTs, high costs of telephone services, limited access to computers, lack of communication policy, high level of rural poverty and illiteracy, limited access to world wide data bases on CD-Rom or DVD due to foreign exchange constraints.

Conclusion and Recommendations

ICTs are essential for sourcing and disseminating information on extension service delivery for agricultural production. Based on this, it was concluded that the socio-economic attributes of the extension agents exerts a great influence on their level of access and utilization of ICT facilities in the area. Hence, effort should be made by agricultural stakeholders to improve these socio-economic variables identified by the study as a means of improving access and utilization of ICTs among extension agents for extension service delivery in Nigeria. In addition to seeking effective ways of addressing the infrastructure, technical and socio-economic constraints limiting extension agents' access and utilization of ICTs for extension service delivery in the study area. We therefore recommend that ICT training programmes should be organised/ established for training of extension workers on use of ICT facilities. This can be achieved by incorporating ICT training in extension service packages. Improvement in rural infrastructure particularly electricity supply is very essential in the study area. Extension agents should be encouraged to have access and utilize ICTs by supporting them with resources both financially and materially. This can be actualised by providing them with credit grant or ICTs' equipment by the government. The current effort of the federal government of Nigeria to distribute 6 million mobile phones to farmers is a good example and will enhance the access and utilization of ICTs among farmers for agriculture production. Such programme should be replicated for the extension agents.

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Tables

Table 1: Distribution of Sampled EAs for the Study According to their Agricultural Zones

State	Agricultural Zones	Sample frame	Percentage Number of EAs Sampled	Actual Number of Sampled EAs
Ebonyi	Ebonyi North	56	21	25
	Ebonyi Central	54	20	24
Enugu	Enugu East	40	15	18
	Enugu North	20	07	9
Abia	Abia Central	50	19	22
	Abia North	49	18	22
Total		269	100	120

Source: Field Survey, 2012.

Table 2: Percentage Distribution of the Respondents (Extension Agents) by Socio-Economic Characteristics

Gender	Frequency (n=120)	Percentage
Male	74	61.67
Female	46	38.33
Age range		
20-29	12	10.00
30-39	42	35.00
40-49	52	43.33
50-59	12	10.00
60-69	2	1.67
70 and above	-	-
Mean age	40 years	
Marital status		
Single	20	16.67
Married	94	78.33
Divorced	6	5.00
Separated	-	-
Widowed	-	-
Educational attainment		
No formal education	-	-
Adult literacy	-	-
Primary education	6	5
Secondary education	12	10
Post-secondary education	102	85
Mean educational level	18 years	
Farm size		
0.0 -0.5	26	39.39
0.6-1.0	15	22.73
1.1 – 1.5	18	27.27
1.6 – 2.0	2	3.03
2.1 – 2.5	3	4.55
2.6-3.0	2	3.03
Mean farm size	0.5	
Household size		
1-3	54	45.00
4-6	44	36.67
7-9	12	10.00
10-12	10	8.33
Mean household size		
Working experience		
<3	35	29.17
4-6	70	58.33
7-9	10	8.33
9 and above	5	4.17
Mean working experience	5 years	
Income categories		
10,000- 20,000	40	33.33
21,000-40,000	62	51.67
41,000-60,000	12	10.00
62,00-80,000	4	3.33
81,000 – 100,00	2	1.67
Membership of social organization		
Yes	64	53.33
No	56	46.67
Primary activities of social organizations		
Multi-purpose cooperative society	20	31.25
Crop production only	18	28.13
Agro-processing	8	12.50
Agro-input market	6	9.38
Agricultural marketing	12	18.75
Presence of power		
Yes	78	65
No	42	35

Source: Field Survey, 2012

Table 3: Influence of Socio-Economic Characteristics of Extension Agents on their Level of Access to ICT Facilities

Variables Code	Variables Name	Regression Coefficients	Standard Error	T – Value
Bo	Constant	0.045	0.021	2.151'NS
X ₁	Age	0.001	0.000	1.376'NS
X ₂	Sex	0.028	0.007	3.762***
X ₃	Educational Attainment	0.002	0.003	0.931'NS
X ₄	Family size	-0.001	-0.002	-2.662***
X ₅	Income level	4.185E-8	0.000	8.230***
X ₆	Membership of social organization	0.014	0.007	2.038**
X ₇	Working Experience	0.003	0.000	3.909***
X ₈	Distance from place of ICTs	0.010	0.003	3.003***
Multiple R		0.771(77.1%)		
R ²		0.694(69.4%)		
Adj. R ²		0.645(64.5%)		
Std Error		0.3855419		
DW		1.786		
F-ratio		20.280		

Source: Data Analysis, 2012. ** and *** indicates significant at 5% and 1% level respectively

Table 4: Influence of Socio-Economic Characteristics of Extension Agents on their Level of Utilization of ICT Facilities.

Variables Code	Variables Name	Regression Coefficients	Standard Error	T – Value
Bo	Constant	4.270	0.454	-4.995***
X ₁	Age	0.018	0.009	-1.966*
X ₂	Sex	0.029	0.012	2.415**
X ₃	Educational Attainment	0.007	0.008	0.794**
X ₄	Family size	0.589	0.055	10.685***
X ₅	Income level	0.986	0.000	-1.996**
X ₆	Membership of social organization	0.016	0.011	1.479 NS
X ₇	Working Experience	0.117	0.134	-0.874*
X ₈	Presence of associated ICT infrastructure e.g electricity	0.240	0.053	1.251***
Multiple R		834 (83.4%)		
R ²		0.696(69.6%)		
Adj. R ²		0.677(67.7%)		
Std Error		0.43508		
DW		2.418		
F-ratio		36.670		

Source: Data Analysis, 2012. *, ** and *** indicates significance at 10%, 5% and 1% level

Table 5: Varimax Rotated Factor Matrix on Constraints to Access and Use of ICTs by Extension Agents.

Variable code	Variables name	Factor I	Factor II	Factor III
Vo ₁	Inadequate/lack of power supply	0.353	0.042	0.134
Vo ₂	Inadequate/scarcity of ICTs supply	0.045	-0.008	-0.723
Vo ₃	Lack of technical know-how	0.276	-0.111	0.009
Vo ₄	High cost of modern ICTs	0.102	-1.153	0.604
Vo ₅	Inadequate/lack of training	-0.106	-0.280	-0.038
Vo ₆	Drop in calls	0.117	-0.046	-0.548
Vo ₇	Low level of illiteracy	-0.143	0.211	0.884
Vo ₈	Poor/lack of network coverage	0.685	0.586	-0.124
Vo ₉	Lack/inadequate supportive infrastructure	0.086	0.622	0.124
Vo ₁₀	Gender discrimination	0.789	0.038	0.133
Vo ₁₁	Poor telephone lines	0.665	-0.183	0.205
Vo ₁₂	Poor access to credit	0.053	-0.571	0.533
Vo ₁₃	Lack of awareness	-0.735	0.248	-0.063
Vo ₁₄	Maintenance problems	0.211	0.327	-0.042
Vo ₁₅	High taxes	0.200	0.550	-0.421

Source: Data Analysis, 2012