
ANALYSIS OF INFORMATION AND COMMUNICATION TECHNOLOGIES USED IN DISSEMINATING AGRICULTURAL NEW TECHNOLOGIES AMONG EXTENSION AGENTS IN IMO STATE

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ABSTRACT

The study analyzed information and communication technologies (ICTS) used in disseminating agricultural new technologies by extension agents in Imo state. Specifically, the study described the socio-economic characteristics of extension agents in the area; identified various ICTs devices extension agents use in agricultural extension delivery in the area; examined the level of utilization of ICTs devices by extension agents in the area and identify the constraints extension agents encounters in the use of ICTs in agricultural extension delivery in the area. A total of 60 extension agents were selected using simple random sampling techniques. Well, structured questionnaire was used for data collection. Data collected were analyzed using descriptive statistical tools and multiple regression analysis. Mean age of extension agent was 46years. The majority (63.33%) were male and about 81.67% were married. Mean household size of extension agent was 6 persons. The majority (51.67%) of the extension agents had the first degree while approximately 55% had between 20 to 30 years of field experience. Radio (100%) and telephone (GSM) (93.33%) were the major ICTs devices extension agents used in the dissemination of agricultural innovation in the area. The result showed a positive and an acceptable level of utilization of various ICTs devices in agricultural extension delivery by extension agents in the area. Estimated multiple regression revealed that the age, marital status, educational Level, field experience and household size of the extension agents significantly influence their level of utilization of ICTs devices at a various significant level in the area. However, among other constraints, extension agents complained particularly of lack of power supply (96.67%) and inability to operate ICTs (91.67%). It was therefore recommended that electrification policies and programmes should focus on providing an adequate power supply for extension agents and farmers in the area. It is also necessary that other source of power supply such as solar building should be provided as these would enhance effective and efficient agricultural delivery in the area.

Keywords: ICTs, Extension Agents, Agricultural New Technologies.

1.1 INTRODUCTION

Agricultural new technologies are innovations which can be seen as the introduction and use of hybrids, the greenhouse technology, genetically modified food, chemical fertilizers, insecticide, tractors and application of other scientific knowledge. The technologies are made

available to farmers through extension services, the extension services are the crucial institution in delivering of agricultural technologies to farmers. The extension service, therefore, creates the platform for an acquisition of the relevant information that promotes technology adoption (Melesse, 2018). Agricultural extension agents are very important in the development of agriculture because they utilize vital agricultural information for the individuals and general improvement of the rural farmers. Agriculture extension is the process of transferring agricultural information and technology to farmers for use in production and marketing decision and similarly transferring information from farmers to researcher (Ani & Baba, 2009). Agricultural extension agents adapt alternative technologies only when they are aware of and are motivated not only to try them out but also try those alternatives correctly. Also, the extension agents are expected to be properly equipped with new information technology and should have access to ICT to help them improve on their jobs.

ICTs are electronic technologies used for creating, acquiring stock processing, communicating and using information. ICT can be technologies that facilitate communication and the processing and transmission of information by electronic means such as computers, radios, television, cellular, phone etc. (Arokoyo, 2005). ICT also encompasses a diverse set of technological tools and resource used to communicate and to create, store, manage and disseminate information (Agwu & Ogbonah, 2014). According to Farell (2003), the ICTs facilitates and promotes the collaboration between agricultural researches, farmers, extension agents. Information And Communication Technology classified by Obayelu & Ogunlade (2006) is categories into three namely; New ICTs comprising e-mail, computers, satellites, one on one connections, wireless phone (mobile), the web, video conference, CD ROMs, personal computers (PC), global positioning systems (GPS), Old ICTs this group of technologies have been used for several decades which include telephones, telegraph, audio and video cassettes, films, slides; and very old ICT such as newspaper, books, photo, albums, posters, theatre market and plays.

The major challenge to agriculture in this new millennium is how to cope with information and trend in technology transfer. The use of ICT that can bring about new technologies in agriculture is yet to be explored. Therefore, access to such new information is a crucial requirement for sustainable agricultural development, especially among extension agents. (Balderama, 2009). It was noted by Ani & Baba (2009) that lack of close working rapport between agricultural research institutes and extension organization and with different categories of farmer organization is one of the difficult institutional problems confronting ministries of agriculture in many developing countries. Despite the era of ICT in agriculture, there is a state of low development in most rural areas in Nigeria. Lack of inadequate access to information and technical information on farming affects extension officers and lead to their failure to attend to farmers problem in time. Extension agents may experience challenges with respect to information dissemination and accessibility to ICTs to increase their agricultural information and knowledge. Lack of infrastructure is found to be the biggest challenge in deploying ICTs to solve agricultural information dissemination problems in Nigeria. Also, the provision of relevant, reliable and comprehensive information support has been identified as a major constraint (Kiplangot, 2003). The effectiveness of extension agents depends largely on the awareness, accessibility, utilization and relevance to accurate and

reliable information. Hence, this study attempt to look at the extent of utilization of ICT among extension agents in Imo state.

1.2 Objectives of the Study

The specific objectives were to;

- i. Describe the socio-economic characteristics of extension agents in Imo State;
- ii. Identify the types of ICTs used by extension agents;
- iii. Determine the level of utilization of ICT among extension agents;
- iv. Determine the effectiveness of the use of ICT by extension agents and
- v. Identify the constraints in the use of ICTs by extension agents.

1.3 Hypothesis of the Study

The null hypothesis tested was:

Ho₁: There is no significant relationship between the socio-economic characteristics of extension agents and the level of utilization of ICTs

2.0 METHODOLOGY

The study was carried out in Imo State, Nigeria. The state is located in the rainforest agro-ecological region of Nigeria and shares common boundaries with Abia State on the East and Northeast, Anambra State on the West and Northwest and Rivers State on the South (Imo State Agricultural Development Project, 2013). The state lies between latitudes 60351 and 70281 East of the Greenwich Meridian. It occupies the area between the lower River Niger and the upper and middle Imo River. Imo State covers an area of about 5,067.20km² with a population of 3,934,899 persons with many subsistence farmers (Nigeria Population Commission (NPC, 2006). The population of the study consists of the entire extension agent in Imo State Agricultural Development Programme (Imo ADP). The sample frame was drawn from the list of the extension agents in the three agricultural zones of Imo State namely Orlu, Okigwe and Owerri provided by the zonal extension units of Imo ADP. Simple random sampling technique was used in selecting the extension agents, twenty extension agents were selected randomly for the study in each of the agricultural zone given a total of sixty (60) extension agents. The primary data were obtained using a structured questionnaire. Data collected for this study were analyzed using descriptive and inferential statistics. Descriptive statistics such as mean, frequency and were used in realizing objective I, ii, iii-iv and v. The null hypothesis was analyzed using multiple regression analysis. The implicit model of regression is stated below $Y_1 = F(X_1, X_2, X_3, X_4, X_5, X_6, + e) \dots \dots \dots (1)$

Where

Y_1 = level of utilization of ICT among extension agent (Total rating scores)

X_1 = Age (years)

X_2 = Gender (Dummy variable, male = 1, female = 0)

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

X_4 = Educational level (years spent in school)

X_5 = Years of working experience (number of years spent in the organization)

X_6 = House hold size (Number of persons)

3.0 RESULTS AND DISCUSSION

3.1 Socio-economic Characteristics of the Extension Agents

The distribution of the socio-economic characteristics of extension agents is presented in Table 1. It reveals that majority (46.67%) of the extension agents fell within the age bracket of 41-50 years and the mean age was 46.00years. This implies that extension agents in the area are still in their middle age. Also, the majority (63.33%) of the extension agents were males. The finding implies that both sexes are involved in agricultural extension delivery but males were dominant than females in the area. The finding is in line with the study of Adetumbi et al., (2013) who noted that the dominance of agricultural extension service to work by male gender is not good for efficiency and effectiveness of agricultural extension services delivery. The result also reveals that the majority (51.67%) of the extension agents had a Bachelor of Science degree (BSc). The finding implies that extension agents had training informal educational institutions which no doubt increases their literacy levels. Greater proportions (81.67%) of the extension agents were married and the majority (55.00%) of the extension agents had between 10-19years of field experience. The implication of the finding is that the extension agents had reasonable years of field experience which no doubt will enhance their decision making, access and effective use of ICTs devices in agricultural extension delivery. The studies of Tanko et al., (2013) reported that experience in agricultural extension delivery enhances performance and improve access and effective use of ICTs devices in agricultural extension delivery. The mean household size was 5.0 persons, this implies that extension agents have a small household size in the area. The findings may be connected to the high level of education extension agents have attained which enabled them to give birth to the number of children they can adequately cater for in the area.

Table 1: Distribution of the Extension Agents according to Socio-economic Characteristics

Socio-economic characteristics	Frequency /mode	Percentage	Mean
Age (Years)	41-50	46.67	46 years
Marital Status	Married	81.67	
Sex	Males	63.33	
Level of Education	B.Sc	51.67	
Household Size	1-5	71.67	5 persons
Field Years of experience	10-19 years	55.00	12.6 years

Source: Field Survey Data, 2018

3.2 Types of ICTs Devices Used by Extension Agents

The result of the types of ICTs devices used by extension agents is compiled in Table 2. It shows that 100% of the extension agents make use of radio in agricultural extension delivery in the area. This is evidence as most of the rural farmers have been reported to have huge access to radio than any other ICTs devices (Salau & Saingbe, 2008). Moreover, this may also be due to various advantages attached to radio facilities which others do not have. These

are personal interaction in terms of contribution during live radio program, language understanding, literacy clarity, avoidance of time wasting and mass outreach (Olaniyi, 2013).

Result also showed that approximately 93.33%, 86.67%, 83.33% and 71.67% identified Telephones (GSM), Internet services (e-mailing), CD ROM and Printer respectively as the part of the ICTs devices used in agricultural extension delivery in the area. The use of telephone might be attributed to the increasing growth in the proliferation and use of cell phones in Nigeria– with its attendant ease of access and at a reasonable cost. Similarly, digital camera, LCD projector and television were identified by 66.67%, 61.67% and 58.33% respectively as the types of ICTs devices they use in agricultural extension delivery in the area.

The poor use of television and the internet may be connected to poor electricity supply, poor connectivity and poor knowledge of internet use by farmers in the study area. As supported by the studies of by Tanko et al., (2013), who opined that the use of ICT facilities has continued to be hampered by the persistent problem of access, connectivity literacy and cost. In a similar vein, there may probably no suitable ICTs devices to be used for agricultural extension delivery, it may only depend on the situation at the disposal of the extension agent (Isiaka et al., 2009).

Table 2: Distribution of the Types of ICTs Devices Used by Extension Agents

ICTs Devices	Frequency	Percentage (%)
Radio	60	100.0
Telephones (GSM)	56	93.33
Internet services (e-mailing)	52	86.67
CD ROM	50	83.33
Printer	43	71.67
Digital camera	40	66.67
LCD Projector	37	61.67
Television	35	58.33

*Multiple Responses are recorded; Source: Field Survey Data, 2018

3.3 Level of Utilization of ICTs Devices by Extension Agents

Table 3 shows the result of the distribution based on the level of utilization of ICTs devices by extension agents in disseminating agricultural new technologies. Using a discriminating index of ≥ 2.0 for acceptance and < 2.0 for rejection, extension agent reported an often an acceptable level of utilization in ICTs devices which includes; Radio (2.92), Telephones (GSM) (2.78), CD ROM (2.85), printer (2.61), digital camera (2.93) and LCD projector (2.51). The often an acceptable level of utilization recorded in the above ICTs device in the area may be connected to the relatively high level of education on part of the extension agents which language understanding, literacy clarity, avoidance of time wasting and mass outreach (Olaniyi, 2013). In the same vein, the use of television for agricultural extension delivery in the area was rejected. However, the poor use of television (1.57) and internet services (1.65) may be connected to poor electricity supply, poor connectivity and poor knowledge of internet services use by farmers in the study area. The findings are strengthened by the studies of Purnomo and Lee (2010) who opined that the use of ICT facilities has continued to

be hampered by the persistent problem of access, connectivity literacy, cost and epileptic power supply.

Table 3: Distribution of the Level of Utilization of ICTs Devices by Extension Agents

ICTs Devices	Often Utilized(3)	Seldom Utilized (2)	Never Utilized(1)	Mean
Radio	56 (93.33)	3 (5.00)	1(1.67)	2.92
Telephones (GSM)	50 (83.33)	7 (11.67)	3 (5.00)	2.78
Internet services (e-mailing)	9 (15.00)	21 (35.00)	30 (50.00)	1.65
CD ROM	53 (88.33)	5 (8.33)	2 (3.33)	2.85
Printer	45 (75.00)	7 (11.67)	8 (13.33)	2.61
Digital camera	54 (90.00)	6 (10.00)	2 (3.33)	2.93
LCD Projector	40 (66.67)	15 (25.00)	5 (8.33)	2.51
Television	10 (16.67)	14 (23.33)	36 (60.00)	1.57

*Accepted Mean= 2.0 and above; *Figures in parenthesis are percentage; Field Survey Data, 2018

Constraints Extension agents face in use of ICTs in Agricultural Extension Delivery

The result of the distribution based on constraints extension agents face in use of ICTs in agricultural extension delivery is compiled in Table 4. It indicates that about 96.67%, 91.67%, 85.00% and 78.33% of the extension agents complained of lack of power supply, inability to operate ICTs, lack of internet services and inadequate ICT tools respectively as the constraints they encounter in the use of ICTs devices in agricultural extension delivery in the area. Lack of power supply left most of the extension agents not to use ICTs device when necessary as well as search for other source of power in order to charge and power their ICTs devices such as the mobile phones and laptops.

However, electricity and power supplies are absolute prerequisites to using contemporary ICT systems. The study of Agwu and Ogbonah, (2014) had earlier observed that several obstacles hinder ICTs usage in developing countries, especially in areas of access to telephone and electricity networks. Inability to operate ICTs left most of the advanced extension agents not to keep abreast on the use of modern and hi-tech ICTs devices. Poor network connectivity is associated with network providers whose networks are always unstable for easy and effective communication. Similarly, 76.67%, 71.67%, 68.33%, 58.33% and 50.00% identified high cost of purchasing ICTs, time consuming, mismanagement of ICTs facilities, lack of training opportunity and inadequate access to credit respectively as constraints militating against their use of ICTs devices in the area. There is no doubt that these problems are responsible for poor access and utilization of ICTs devices by extension agents in agricultural extension delivery in the area, addressing these problems will not only be vital for effective extension delivery in the area but sustainable agricultural production.

Table 4: Distribution of Constraints Extension agents face in use of ICTs in Agricultural Extension Delivery

Constraints	Frequency	Percentage (%)
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Lack of power supply	58	96.67
Inability to operate ICTs	55	91.67
Lack of internet services	51	85.00
Inadequate ICT tools	47	78.33
High cost of purchasing ICTs	46	76.67
Time consuming	43	71.67
Mismanagement of ICTs facilities	41	68.33
Lack of training opportunity	35	58.33
Inadequate access to credit	30	50.00

*Multiple Responses are recorded; Source: Field Survey Data, 2018

Socio-economic Characteristics of Extension Agents that Influence their Level of Utilization to ICTs Devices

Table 5 shows the influence of extension agents socio-economic characteristics on their level of utilization to ICTs devices. Multiple regression analysis was carried out and four functional forms, linear, semi-log, double-log and exponential forms were tried. Based on the statistical significance of the coefficient and goodness of fit, the exponential regression function was chosen as a lead equation based on the values of R² (78.6), F-Ratio value (15.50), the highest number of significant variables (six variables) and conformity of the signs with a priori expectations.

Age (X1): Age was found to be negatively related to the level of utilization of ICTs devices by extension agents but it is statistically significant at 1% level of probability. This implies that younger extension agents are expected to have a higher level of ICTs assess and usage since the older extension agents might be less interested in using hi-tech communication devices, they may prefer oral which are less efficient to modern ICTs devices. This finding is in agreement with the study Adetumbi et al., (2013) who opined that middle-aged extension agents are still in their active age, more receptive to agricultural innovation, more efficient in extension delivery and could have good assess and utilization of ICTs devices for effective agricultural extension delivery.

Marital Status (X3): Marital status had a negative coefficient with the level of utilization of ICTs devices by extension agents and it is statistically significant at 1% level of probability. This implies that single extension agents had more utilization and access to ICTs devices than their married counterpart. This finding supports the result of Sanusi et al., (2010) who opined that married individual tends to be less efficient in the agricultural extension delivery due to pressure and distraction from children, wards, relatives and other members of their households.

Educational Level (X4): Education had a positive coefficient with the level utilization of ICTs devices by extension agents hence it is statistically significant at 1% level of probability. It is expected that extension agents with a higher level of education should be able to appreciate the use of ICTs devices in their agricultural research and extension delivery. The study shares view with the findings of Salau & Saingbe (2008) who asserted that higher education correlates positively with efficient access and use of ICTs devices.

Household Size (X5): Household size had a negative coefficient with the level of utilization of ICTs devices by extension agents and statistically significant at 1% level of probability. Extension agents with large household size are always distracted with household issue hence reduces their access and utilization to ICTs devices.

Field Experience (X6): Experience had a positive coefficient with the level of utilization of ICTs devices by extension agents and is statistically significant at 1% level of probability. The finding is also in line with the study of Adetumbi et al., (2013) who opined that extension agents with more experience would be more efficient in the utilization of ICTs devices in agricultural extension delivery. The study concludes that the socioeconomic characteristic of the extension agents has a significant influence on their level of utilization of ICTs devices in the area.

Table 5: Estimated Regression Analysis of the Influence of Extension Agents Socio-economic Characteristics on their Level of Utilization of ICTs Devices

Explanatory variables	Linear	Semi-log	Double-log	Exponential
Constant	10.194 (4.312)**	2.550 (5.078)**	3.426 (2.990)**	18.298 (8.760)**
Age (X ₁)	0.008 (0.396)	-0.002 (-0.369)	0.082 (0.439)	-0.078 (-7.443)**
Sex (X ₂)	0.167 (0.945)	0.034 (3.905)**	0.132 (1.204)	-0.205 (-0.088)
Marital Status (X ₃)	0.097 (0.517)	-0.025 (-0.629)	0.053 (2.525)**	-0.035 (-5.205)**
Educational Level (X ₄)	0.002 (2.070)*	0.000 (0.051)	0.000 (0.001)	0.003 (2.146)*
Household Size (X ₅)	-0.687 (-2.139)*	-0.129 (-1.887)	-0.713 (-1.911)*	-0.026 (-3.279)**
Field Experience (X ₆)	0.016 (0.571)	-0.002 (-0.360)	-0.051 (-0.419)	0.002 (4.109)**
R ²	62.5	55.7	69.7	78.6
R ⁻²	54.4	49.6	65.6	76.2
F-Ratio	7.041***	9.847***	11.946***	15.500***

Values in Parenthesis are t-values *Statistically Significant at 5%; ** Statistically Significant at 1%.

4.0 CONCLUSION AND RECOMMENDATIONS

This research work analyzed ICTs used in disseminating agricultural new technologies by extension agents in Imo state. Estimated multiple regression revealed that the Age, Marital Status, Level of Education, Field Experience and Household Size of the extension agents significantly influence their level of utilization of ICTs devices at a various significant level in the area. No doubt the use of ICTs devices has been invaluable for extension agents in agricultural extension delivery in the area. However, among other constraints, extension agents complained particularly of lack of power supply and inability to operate ICTs. The

following recommendations were made based on the major findings of the study. Electrification policies and programmes should focus on providing adequate power supply in the area; It is also necessary that other source of power supply such as solar building should be provided as these would enhance effective and efficient agricultural delivery in the area; extension agents should also be retrained on the use of various ICTs devices as this would enhance agricultural extension delivery positively in the area and maybe beyond; There is the need for an upward review of the salary of extension officers. This is because an increased income would guarantee better chances of personal acquisition of ICTs equipment for the officers; In the interim, agricultural extension officers should be assisted to access ICT at affordable prices such as through hire purchase arrangements with payment extended over a period of time. Members are also encouraged to take advantage of cooperative societies common in most government establishments to acquire ICT devices at reduced interest rates and convenient payment terms.

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