



## Challenges to Adoption of ICT Tools by Agricultural Extension Workers in Anambra State, Nigeria

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### Authors' contributions

*This work was carried out in collaboration between both authors. Author ENC designed the study, wrote the protocol and supervised the work. Author TSN carried out all laboratories work and performed the statistical analysis. Author TSN managed the analyses of the study. Author ENC wrote the first draft of the manuscript. Authors ENC and TSN managed the literature searches and edited the manuscript. Both authors read and approved the final manuscript.*

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### ABSTRACT

The study investigated the challenges to adoption of ICT by extension workers in Anambra State of Nigeria. Stratified sampling technique was used to select 69 respondents sampled from each cadre of the Anambra State Agricultural development Programme (ASADEP). Findings revealed that majority (92.8%) of the respondents had access to mobile phone. The ICT tool most frequently used was mobile phone as was indicated by majority (88.4%) of the respondents. Results showed that majority of the respondents agreed to some positive attitude statements to adoption of ICT tools including: making use of ICTs will help improve linkage between research and extension (94%.2); however, majority of the respondents agreed to some negative attitude statements including: I am very afraid of the internet because of the rampant fraud done through it (97.1%). Challenges to adoption of ICT tools include: power/electricity instability (M=1.68), lack of training on ICT use (M=1.4) etc. The study concluded by identifying major infrastructural, capacity and attitudinal challenges to adoption of ICT tools by extension workers in the area. It is recommended

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that ICT-enabling opportunities should be provided to extension personnel in the state through provision of ICT infrastructure, technical training and attitudinal re-orientation.

*Keywords: Challenges to ICT adoption; ICT training; ICT enabling opportunities; ICT infrastructure.*

## 1. INTRODUCTION

Information and communication technology is an omnibus term that encompasses computer and telecommunications technology [1]. These technologies are increasingly being seen as cost-effective and as practical tools to facilitate information delivery and knowledge sharing among farmers, extension agents and other stakeholders [2]. ICT has an important role in connecting research, extension and the market, toward expanding the professional and entrepreneurship abilities and capabilities among the experts and agricultural communities [3]. Agricultural extension, which depends to a large extent on information exchange between and among farmers, is one area in which ICT can have a significant impact [4]. Broad based agricultural extension activities, developing farming system research and extension, having location-specific modules of research and extension, and promoting market extension, sustainable agricultural development, participatory research, etc. are some of the numerous areas where ICT can play important roles [5].

The intensification of information exchange between farmers, agribusiness and state agencies has a growing impact on the application of ICT [6]. Njoku and Ndeche [7] asserted that agricultural and rural development should encompass a shift from the traditional techniques of agricultural production activities to new science-based methods, involving also new technological components such as weather prediction tools for precision practice, and farming systems that includes e-farming and marketing (e-commerce).

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 [8]. Meera, Jhamanti and Rao [9] noted that as a result of the emerging new paradigm of agricultural development, old ways of delivering important services to citizens are being challenged; traditional societies are also being transformed into knowledge societies all over the world. However, these problems could be alleviated by

effective exploitation of innovative solutions that integrate information and communication technologies in agricultural information delivery [10]. In line with this, Omotayo [11] observed that frontline extension workers who are the direct link between farmers and other actors in the extension of agricultural knowledge and information are well positioned to make use of ICTs to access expert knowledge or other types of information that could facilitate the accomplishment of the farmers' production objectives. ICT can help by enabling extension workers to gather, store, retrieve and disseminate a broad range of information needed by farmers, thus transforming them into knowledge workers. The emergence of such knowledge workers will result in the realization of the much desired bottom-up, demand-driven agricultural extension service delivery. However, despite these potential benefits, adoption of ICT tools for extension service delivery is still very low in Southeast Nigeria [12] of which Anambra State is a part. The study therefore aimed to find out the challenges for adoption of ICT tools in Anambra State public extension service.

### 1.1 Purpose of the Study

The study investigated the challenges to adoption of ICT tools by public extension workers in Anambra State of Nigeria. Specifically, the study sought to:

1. Ascertain the level of access to ICT tools among extension workers in the area;
2. Ascertain frequency of use of ICT tools in extension service delivery;
3. Determine attitude of extension personnel to adoption of ICT in its service delivery; and
4. Ascertain challenges to effective use of ICT tools in extension service delivery in the area.

## 2. MATERIALS AND METHODS

The study was carried out in Anambra State, Nigeria. All public extension (Agricultural Development Programme (ASADEP)) staff in the State constituted population for the study. Stratified sampling technique was adopted in

selecting four (4) zonal managers, four (4) Zonal Extension Officers, seven (7) Subject Matter Specialists, fifteen (15) Block Extension Supervisors, six (6) Block Extension Agents, and thirty three (33) extension agents giving a total of sixty nine (69) respondents used for the study. Data were collected using questionnaire. Data on access to ICT tools were collected by asking respondents to indicate the type of ICT tools they have access to while data on frequency of use was collected by asking respondents to tick from a list of ICT tools to indicate which they do not use, the ones rarely use and those they frequently use. Their responses were later ranked to identify the most frequently used ICT tools among respondents. In order to ascertain the attitude of extension workers to adoption of ICTs in extension service delivery in the area, respondents were asked to tick on a set of positive and negative attitude statements to indicate their perceptions. To obtain information on the challenges to adoption of ICT tools for extension service delivery, respondents were asked to rate their perceived constraint to adoption of ICTs in extension service on a three-point Lykert-type scale of a great extent (2), some extent (1) and no extent (0) with a cut-off point of 1. Data were analysed using descriptive statistics.

### 3. RESULTS AND DISCUSSION

#### 3.1 Access to ICT Tools

Table 1 shows that majority (92.8%) of the respondents have access to mobile phone, while 52.2% had access to computer, and 50.7% had access to radio. ICTs that are not available includes; television (46.4%), telephone (43.5%), internet (40.6%), GPS (18.8%), video camera (15.9%), audio recorder (15.9%), and remote sensing equipment (10.1%). The study collaborates that of Ezech [12] which found that majority of extension agents in south east Nigeria had access to mobile phone but very low percentage had access to internet connected computer, audio recorder and GIS. Lack of access to Information communication technologies is a fundamental challenge to its adoption.

#### 3.2 Frequency of Use of ICT

Data in Table 2 shows that majority (88.4%) of the respondents used mobile phone frequently while 42.0% used television, 36.2% used radio, 30.4% used computer and 29.0% used the internet frequently. On the other hand, majority

(85.5%) of the respondents indicate they did not used remote sensing equipment while 82.6%, 78.3%, 76.6% and 72.5% indicated they did not use audio recorder/player, audio-visual aid, Global positioning system (GPS), and video camera respectively. These results reveal a very low level of adoption of ICT tools in extension service delivery in the area. As ICT tools are well known for augmenting the efforts of agricultural extension personnel, the implication of these findings is an agricultural extension approach that may not meet the current global trend in agricultural extension service and a concomitant inability to meet farmers demand in the face of a serious dearth in the extension-farmer ratio in the country.

**Table 1. Percentage distribution of respondents' access to ICT tools**

ICT tools	Access	
	Frequency (*)	Percentage (%)
Radio	35	50.7
Television	32	46.4
Telephone	30	43.5
Mobile phone	64	92.8
Computer	36	52.2
Internet	28	40.6
Video camera	11	15.9
Audio recorder/player	11	15.9
GPS	13	18.8
Remote sensing equipment	7	10.1
Audio visual aid	8	11.6

*\*Multiple responses*

#### 3.3 Attitude of Extension Personnel to ICT Use

Table 3 shows the attitude of extension personnel to adoption of ICT in its service delivery. From the table, majority of the respondents agreed to some positive attitude statements including: making use of ICTs will help improve linkage between research and extension (94.2%), making use of ICTs will help improve linkage between extension and farmers (84%), the future of my job efficiency lies in the use of internet resources (69.5%). On the other hand, majority of the respondents agreed to some negative attitude statements including: I am very sceptical of the internet because of the rampant fraud done through it (97.1%), ICTs are stressful and boring to use (84%), Our farmers are illiterate, using e-resources will not be

necessary (71%). Also, result show that majority of respondents had a negative attitude to maintenance of ICT tool in their office as shown by a minority score of 31.8% that do repair ICT tools in their office. According to the European Commission [13], there may be a mental barrier to some farmers and other actors (researchers, extension agents etc.) in the food chain to acquire and use ICT hardware and software tools. It is against this backdrop that issues of awareness creation and re-orientation comes to the fore. Agricultural extension workers should be made to be aware of the potentials of ICT in improving extension service as well as the possible ways of ensuring security of data which is always the concern of most ICT sceptics.

### 3.4 Challenges to Effective Utilization of ICT Tools among Extension Services

Table 4 shows the challenges to adoption of ICT tools by public extension workers in the area. The identified challenges include: power instability (M=1.68), and high cost of ICT tools (M=1.57). Other challenges includes: lack of training on ICT use (M=1.41), unavailability of ICT tools (M=1.38), (M=1.32), high cost of maintenance of ICT tools (M=1.35), inadequate skill to operate and manage ICT tools (M=1.25), Weak internet connectivity (M=1.17). Problem of hierarchy (limited to some staff only) (M=1.12), and limited internet coverage (M=1.06).

**Table 2. Percentage distribution of respondents according to frequency of use of ICT tools (\*)**

ICT tools	Not used		Rarely used		Frequently used		Rank order
	Freq.	%	Freq.	%	Freq.	%	
Radio	34	49.3	10	14.5	25	36.2	3 <sup>rd</sup>
Television	36	52.2	4	5.8	29	42.0	2 <sup>nd</sup>
Telephone	45	65.2	5	7.2	19	27.5	6 <sup>th</sup>
Mobile phone	7	10.1	1	1.4	61	88.4	1 <sup>st</sup>
Computer	25	36.2	23	33.3	21	30.4	4 <sup>th</sup>
Internet	36	52.2	13	18.8	20	29.0	5 <sup>th</sup>
Video camera	50	72.5	14	20.3	50	7.2	9 <sup>th</sup>
Audio recorder/player	57	82.6	10	14.5	2	2.9	11 <sup>th</sup>
GPS	53	76.8	10	14.5	6	8.7	8 <sup>th</sup>
Remote sensing equipment	59	85.5	4	5.8	6	8.7	8 <sup>th</sup>
Audio visual aid	54	78.3	12	17.4	3	4.3	10 <sup>th</sup>

*\*Multiple responses*

**Table 3. Attitude of extension personnel to ICT**

Attitudes variables	Frequency	Percentage
I am very much skeptical of the internet because of the rampant fraud done through it	67	97.1
Making use of ICTs will help improve linkage between research and extension	65	94.2
ICTs are very stressful and boring to my liking	58	84.0
The future of my job efficiency lies in the use of internet resources	48	69.5
I have always repaired the ICT tools in my office	22	31.8
ICTs could lead to disengagement of extension staff	53	76.8
Making use of ICTs will help to improve linkage between extension and farmers	58	84.0
ICTs and internet facilities are complex to understand and use	49	71.0
Our farmers are illiterate, using e-resources will not be necessary	49	71.0
Though it may be of help, yet it has much inconveniences than I can bear	46	66.7

**Table 4. Mean distribution of respondents according to challenges to adoption of ICT tools in extension services**

Constraints	Mean	Std. deviation
High cost of ICT	1.57*	0.606
Power instability	1.68*	0.528
Inadequate skill to operate and manage ICT tools	1.25*	0.715
Lack of training on ICT	1.41*	0.626
Unavailability of ICT tools	1.38*	0.750
High cost of maintenance of ICT tools	1.32*	0.675
Lack of internet connectivity	1.28*	0.725
High cost of internet access	1.26*	0.678
Weak internet connectivity	1.17*	0.727
Limited internet coverage	1.06*	0.684
Problem of hierarchy (limited to some level of staff only)	1.12*	0.777

\*Significant scores

In a study by Albert [14], a major constraint to effective use of ICT among extension professionals is the issue of unavailability of ICT infrastructure. Salau et al. [15] found that poor access to ICTs was a major constraint to utilization of ICTs among extension workers in Nasarawa State of Nigeria. According to Ismail and Bongogoh [16], training and development program is a strategic function of human capital management which focuses on developing employee competencies in order to overcome daily, routine and short-term problems. Ndag et al. [17], found that computer training was a significant factor to ICT use among extension workers. Inadequate skill as a result of lack of ICT training is therefore a big barrier to adoption and use of ICT. This situation is also tied to scepticism and indifference on the use of ICT. Even when ICT facilities are provided for the public extension personnel, the requisite training is paramount for effective adoption. However, when either ICT facilities or the training are not provided, adopting ICT in extension service delivery becomes a mirage.

#### 4. CONCLUSION

The study reveals a number of infrastructural, capacity and attitudinal challenges to adoption of ICT tools by extension workers in the area ranging from unavailability of ICT infrastructure to lack of training/requisite skills on the use of ICTs and negative attitude on the part of extension workers among others. It is therefore recommended that the State and Federal Governments should provide ICT-enabling opportunities to extension personnel in the State through provision of ICT infrastructure, technical training and attitude re-orientation in order to enhance the performance of public extension personnel in the area.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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