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Utilization of Digital Tools in Extension Service Delivery amongst Extension Agents in Akwa Ibom State, Nigeria

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CBL (40%). Conceptualization, development of data collection instrument, data collection, first draft

Abstract

This study examined the use of digital tools in extension services delivery amongst extension agents in Akwa Ibom State, Nigeria. Simple random sampling was used to select 47 agricultural extension agents for the study. Data were collected using a structured questionnaire while analysis of the data was done using mean, percentages, and the Binary Logit regression analysis. Results showed that the majority (74%) of the agents indicated that they used digital tools in agricultural extension service delivery with WhatsApp ($\bar{x}$ =3.60) and Video camera ($\bar{x}$ =3.60) as the most used digital tools among them. The extension agents were highly knowledgeable in the use of WhatsApp ($\bar{x}$ =3.68), and mobile phone calls ($\bar{x}$ =3.66). Age, educational status, household size, working experience and sex were found to affect extension agents' utilization of digital tools. The major constraints were epileptic power supply ($\bar{x}$ =3.72) and loss of privacy over the internet ($\bar{x}$ =3.66). The study concludes that agricultural extension agents in Akwa Ibom are aware of and utilize digital tools though constrained by some factors. It therefore stressed the need for training and retraining of extension agents on the use of digital tools by the Agricultural Development Programme.

Introduction

The agricultural sector in Nigeria is facing numerous limitations, varying from poor infrastructure, and poor linkage between stakeholders to extreme weather events. (Wasihun, 2022; Geeta et al. 2019). These limitations hinder the achievement of the

food security agenda of the nation and exacerbate poverty and hunger, especially among rural dwellers. Deployment of digital tools in agricultural communication will not only help in establishing the needed linkages but will also strengthen the few existing ones hence improving information and experience sharing in the sector. Digital tools hold much potential in this regard. Digital tools consist of various resources and technical tools used for accessing, storing and sharing information.

For effective and timely information dissemination by agricultural extension agents (AEAs), the agricultural extension system needs an alternative strategy for information dissemination rather than the traditional face-to-face and other manual means. There is a need for strategies that could boost quick and easy access to information, thereby reducing stress for both farmers and extension agents.

In recent times, much emphasis has been placed on the need for timely services by agricultural extension agents. The increasing extreme weather events have also heightened the need for timely agricultural information delivery. All these points towards the need for extension agents to sharpen more of their skills and knowledge on the use of digital tools to meet the demand for timely information delivery. Digital tools are known to facilitate timely information sharing, reduce cost and support immediate feedback from farmers hence the need to leverage them in agricultural extension service delivery.

Furthermore, Nigeria experiences the problem of an insufficient number of extension agents in the extension services in Nigeria; According to the African Seed Access Index (TASAI) 2020 report, Nigeria has the lowest ratio of agricultural extension workers to farmers' ratio in Africa with extension agents to farmer ratio of 1:7500. Unfortunately, farming communities are geographically located far apart in difficult-to-reach zones, ranging from 15 to about 60 square kilometers (TASAI, 2020) and this have to be covered by very few agricultural extension agents.
Bearing in mind the insufficient number of available AEAs and the large geographical area to be covered, there is a need to identify possible tools that could facilitate timely information dissemination in the system hence the need to harness the potential of digital tools in extension service delivery.

Furthermore, the poor funding and scarcity of resources to support the few available extension agents in disseminating information constitute another major challenge in agricultural extension services. This makes the application of digital tools in extension service delivery more cogent. Though, rural farmers are generally known to be illiterate who are poorly knowledgeable in the use of digital tools (Agula et al*,* 2018; Abuta et al., 2021). There exist simple, accessible and easy-to-use digital tools which the farmers can easily operate. In addition, many commercial farmers are known to be literate and exposed to the use of digital tools and other modern technologies for agricultural production. Furthermore, the fact that farmers are not the only users of agricultural information makes the use of digital tools more relevant in the timely dissemination of information among all agricultural stakeholders.

In an era where, precision agriculture and the use of open and large data have become indispensable, the use of digital tools becomes more critical to facilitate information sharing. It is against this background that this study assessed the utilization of digital tools amongst extension agents in Akwa Ibom state with a view to determining their knowledge of the utilization of digital tools in delivering extension services to farmers. This will significantly contribute to enhancing agricultural information dissemination in the state hence stimulating improved livelihood for the farmers.

This study determined the utilization of digital tools in extension service delivery among agricultural extension agents in Akwa Ibom State. Specifically, the study determined the awareness of digital tools among agricultural extension agents; ascertained the utilization and level of utilization of digital tools among the extension agents; determined digital tools perceived knowledge level among extension agents; determined the constraints to the utilization of digital tools among agricultural extension agents and determined the relationship between the socio-economic characteristics of agricultural extension agents and their use of digital tools.

Methodology

This study was conducted in Akwa Ibom State, Nigeria. The state has an approximate land area of 7, 249 Sq. Km. and lies between latitudes 4° 33'' N and 5° 33'' North and Longitudes 7° 35'' E and 8° 35'' North. Akwa Ibom State had a total population of 4,780,581 people in 2019 (NBS, 2020).

The population for the study comprised the 52 agricultural extension agents working in the Akwa Ibom State Agricultural Development Programme (ADP). A simple random sample selection was used to select 90% (47) of the total population of the agricultural extension agents in the state for the study. Questionnaire administration was employed in collecting data for the study while descriptive statistics (namely frequency counts, percentages, mean) and Binary Logit Regression were used to analyze the data obtained.

The level of utilization of digital tools among the EAs was captured using a four-point Likert-type scale of highly utilize (4), utilize (3), somehow utilize (2) and not utilize (1) and based on the weights assigned, a midpoint of 2.50 was obtained implying that mean scores equal to or higher than 2.50 indicates a high level of utilization while mean score of less than 2.50 indicates no utilization. Agricultural extension agents perceived knowledge level of digital tools was captured using a four-point Likert-type scale of very knowledgeable (4), knowledgeable (3), somehow knowledgeable (2) and not knowledgeable (1) with a midpoint of 2.50. The decision rule is that mean scores of 2.50 and above imply that the extension agent is knowledgeable in the use of digital tools while mean scores of less than 2.50 imply not knowledgeable. Constraints to the use of digital tools among agricultural extension agents were captured using a four-point Likert-type scale of strongly agree (4), agree (3), disagree (3) and strongly disagree (1). Based on the weights assigned, a midpoint of 2.50 was obtained. The decision rule is that a mean score of 2.50 and above indicates agreement with the statement while a mean score of less than 2.50 posits disagreement with the statement.

The model specification for the Binary Logit regression analysis is implicitly stated as follows:

$C_{ij} = \beta_0 + \beta_1 T_1 + \beta_2 T_2 + \beta_3 T_3 + \beta_4 T_4 + \beta_5 T_5 + \beta_6 T_6 + \beta_7 T_7 + u$

Cij, = Dummy variable= 1 if the extension agent uses the digital tool and 0 otherwise.
T1 = Marital status (Married = 1, Single = 0)
T2= Age (years)
T3= Educational qualification (No formal education = 0, Formal Education = 1)
T4 = Household size (number of persons in the household)
T5 = Working experience (Number of years spent working)
T6 = Monthly income (Naira)
T7 = Sex (Male = 1, Female = 0)
u = stochastic error term.

Results and Discussion

Awareness of Digital Tools among Agricultural Extension Agents

Results in Table 1 show that all the AEAs were aware of digital tools available for agricultural information dissemination. As regards the utilisation of digital tools among agricultural extension agents in Akwa Ibom State, the results showed that the majority (74%) of the agricultural extension agents used digital tools in agricultural communication. This corroborates the findings of Owolabi and Yekinni (2022) who reported that extension agents were aware of digital tools and were also able to utilize digital tools in agricultural extension service delivery, particularly in linking clients to markets.

Table 1: Awareness and utilization of digital tools among agricultural extension agents

Variables	Percentage (Yes)
Awareness	
Aware	100
Utilization	
Yes	74

Source: Field survey, 2023

Level of Utilisation of Digital Tools for Extension Services Delivery Among Agricultural Extension Agents

Results in Table 2 reveal the level of utilisation of different digital tools by extension agents in the study area. As shown in the Table, the major digital tools highly utilised by extension agents were mobile phone calls *($\bar{x}$ =3.74),* WhatsApp *($\bar{x}$ =3.60),* and video players *($\bar{x}$ =3.57)*. It was surprising that the extension agents indicated a high level of utilization of eleven out of the sixteen digital tools indicating that their level of utilizing digital tools contradicts the assumption that that they do not utilize digital tools in

extension service delivery. These findings are similar to the outcome of Ibe et al, (2023) who found that WhatsApp was one of the major digital tools utilized by agricultural practitioners in information dissemination. Oyakhilomen et al, (2020) reported that extension agents are willing to utilize digital tools but prefer user-friendly interface that requires less time to generate results. This buttresses more the fact that AEAs were interested in utilizing digital tools but need support to facilitate the usage of the tools.

Table 2: Level of utilisation of digital tools for extension services delivery among agricultural extension agents

Digital tools	Mean	Standard Deviation
Mobile phone calls	3.74**	2.1
WhatsApp	3.60**	2.0
Video player	3.57**	1.9
Radio	3.55**	1.8
Television	3.49**	1.7
SMS	3.33**	1.6
Facebook	3.28**	1.6
Audio visuals aids	3.23**	1.5
Computers and laptops	3.11**	1.3
YouTube	3.02**	1.1
Tablets	2.81**	1.1
Instagram	2.45*	0.9
Geographic Information System (GIS)	2.18*	0.8
Remote sensing equipment	1.98*	0.7
Blogs	1.91*	0.6
LinkedIn	1.87*	0.4

Source: Field survey, 2023 **High, *Low

Level of Perceived Knowledge of Digital Tools among Agricultural Extension Agents

Results in Table 3 indicated that the AEAs were knowledgeable in the utilization of WhatsApp applications *($\bar{x}$ =3.68),* mobile phone calls *($\bar{x}$ =3.66),* and Radio *($\bar{x}$ =3.55)*. The use of WhatsApp among farmer groups has been observed to have increased in recent times. Many farmer groups resorted to creating WhatsApp groups for chatting as an easy means of information dissemination among members.

Phillip and Ndirpaya (2020) in their study of digitization in Agriculture, Food and Nutrition in Nigeria stated that AEAs possess some level of digital literacy and skills in the use of ICTs but need training and retraining that enable them to employ such expertise in the sector. Similarly, Ajah and Chigozie-Okwum, (2019) also reported that AEAs are knowledgeable in the use of digital tools in extension service delivery.

Table 3. Level of perceived knowledge of digital tools among agricultural extension agents

Digital tools	Mean	Standard Deviation
WhatsApp	3.68**	1.9
Mobile phone calls	3.66**	1.9
Radio	3.55**	1.7
Video player	3.53**	1.5
Television	3.49**	1.4
Facebook	3.38**	1.2
Audio visuals aids	3.26**	1.1
Computers and laptops	3.15**	1.1
YouTube	3.04**	1.0
SMS	3.04**	0.9
GIS	2.94**	0.8
Instagram	2.66**	0.7
Tablets	2.51**	0.7
Remote sensing equipment	2.11*	0.6
Blogs	2.06*	0.6
LinkedIn	2.04*	0.5

Source: Field survey, 2023 **Knowledgeable

Constraints to the Use of Digital Tools among Agricultural Extension Agents

Table 4 shows the constraints faced by agricultural extension agents in utilizing digital tools. The major constraints were epileptic power supply *($\bar{x}$ =3.72)*, fear of losing privacy or data over the internet *($\bar{x}$ =3.66)*, poor internet coverage and associated disruptions in rural areas *($\bar{x}$ =3.32),* and the cost of acquiring digital tools *($\bar{x}$ =3.30)*.

This finding conforms with that of Adelekun et al, (2020) and Mustapha et al, (2018) who reported the cost of digital tools, poor internet connectivity, and poor electricity supply as the major constraints hindering the effective use of digital tools in Nigeria. Similarly, Godson-Ibeji et al, (2018) reported erratic power supply (100%), poor network coverage (100%) and high cost of electrical gadgets (77.5%) as the key challenges faced by agricultural extension personnel in the use of e-extension tools in Imo State. In the same vein, the findings of Ibe et al, (2020) corroborate this finding and they reported that the cost of acquiring digital tools was a major challenge in the utilization of digital tools among extension agents.

Table 4: Constraints to the use of digital tools among agricultural extension agents

Digital tools	Mean	Standard Deviation
Epileptic power supply	3.72**	2.1
Fear of loss of privacy and data over the internet	3.66**	2.1
No internet coverage and associated disruptions in rural areas	3.32**	1.9
Digital tools are too expensive	3.30**	1.9
The problem of affordability of the tools	3.11**	1.7
High maintenance cost of digital tools	2.91**	1.6
Insufficient useful information and data for extension work discourages me from using internet-based tools	2.91**	1.6
Farmers nonchalant attitude towards digital tools	2.77**	1.4
High cost of internet access	2.68**	0.9
Lack of training to enhance my capacity on the use of digital tools	2.55**	0.7
I don't have the skill and capacity on the use of digital tools	2.51**	0.6

Source: Field survey, 2023 **Agreed

Relationship between Socio-Economic Characteristics of Agricultural Extension Agents and Utilization of Digital Tools in Akwa Ibom State, Nigeria

Table 4 shows that the explanatory variables significantly (Chi-square 79.882) discriminated between agricultural extension agents who used digital tools and those who did not. The R-square value was 0.730, meaning that the combined effects of all independent variables (namely, age, sex, marital status, educational status, monthly income, working experience, and household size) in the model were responsible for 73 percent of the variations in the use of digital tools. Five factors [age (4.181), educational status (3.70), monthly income (1.984), working experience (3.873) and sex (.271)] were statistically significant in effecting extension agents' utilization of digital tools. This implies that extension agents who are older, more educated, male, earn higher income and have worked for a long time are more likely to utilize digital tool.

The findings of this study are similar to earlier research conducted by Okeet at al, (2019) that educational level and sex are among the factors influencing the usage of digital tools by maize farmers in the study area. In the same vein, Alhassan et al. (2022) found that social media usage by AEAs for extension services is influenced by age, education, income and sex while Ajena (2018) in the study, Agriculture 3.0 or (Smart) Agroecology? emphasized digital tools could be viable drivers of innovation adoption particularly when socioeconomic factors are addressed.

Table 5: Relationship between the socio-economic characteristics of agricultural extension agents and their utilization of digital tools

Variables	Coefficient	Std. Error	Z-Stat
Sex	.271	.059	19.113*
Age	4.181	1.412	11.530*
Marital status	1.514	.541	3.241
Educational status	3.740	1.696	16.2418*
Monthly income	1.984	.513	17.853*
Working experience	3.873	1.038	16.613*
Household size	18.179	14565.153	.000
Constant	-3.301	3.113	.000
Omnibus Test Chi Square	79.882		
Prob > Chi Square	0.000		
R-square	.730		

Source: Field Survey, 2021. *P≤ 0.01

Conclusion and Recommendations

Enhancing the knowledge level of agricultural extension agents in the use of digital tools is key to maximizing the benefits of utilising such tools. It emphasized the need to recognize and address key socio-economic variables affecting the use of digital tools among extension agents as this could positively impact usage.

There is therefore need for training and retraining of agricultural extension agents on the use of digital tools. This could be incorporated into the fortnightly meetings of the Agricultural Development Programme (ADP). Also, the government through the ADP should provide a supportive environment for the use of these tools by AEAs, for example, having internet service in their workplaces will go a long way to encourage the use of digital tools by AEAs.

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