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Digital Tools Utilization Among Extension Agents in Edo State, Nigeria

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ABSTRACT

The use of digital tools has been hailed as a critical step in advancing agricultural extension work in this decade. This study examined the level of utilization of digital tools in extension service delivery amongst extension agents in Edo State. A structured questionnaire was used to obtain relevant information from fifty (50) out of eighty-eight (88) extension agents in the State, that were selected using two stage sampling procedure. Data were analysed using descriptive (frequency, percentage and mean) and inferential statistic (logit regression). Results showed that there were more males (72%) respondents among the extension agents and majority were single (64%), educated (94%) and in their productive age. Results also show that the extension agents (100%) were aware of most digital tools and were able to use them (mobile phone (mean=3.00), television (mean=2.86), emails (mean=2.86), WhatsApp (M=2.86), Facebook (Mean =2.86). However, the frequency of usage of TikTok, (mean =1.82), YouTube (mean =1.28),E- journals (mean = 1.14) and some others were low. The logit regression result showed a non-significant relationship between the socio-economic characteristics (age =0.025), marital status (2.195, Educational level (1.483) of agricultural extension agents and their usage of digital tools. The study recommended that relevant agencies as well as government and non-governmental agencies should assist in the provision of digital tools to extension agents and encourage them to use modern digital tools that are not frequently used. Also, there should be a comprehensive training programs to enhance the digital literacy skills of extension workers.

Keywords: Extension agents, Utilization ,Digital tools, Service ,delivery

INTRODUCTION

Digital tools are technological tools that you can use to prepare, support or enrich your lesson. Digital tools are ideal for a long term behavioural change to be achieved. Huge amount of information can be stored locally or remotely and moved around virtually instantaneously. Information refers to data in electronic or paper form which has to be handled well through appropriate procedures and standards(Akabuna,2024). Information has expanded to include media such as photos, audio and video and no longer refers to just words and numbers. Digital technology benefits; social connectivity, communication speeds, versatile working, information storage etc (Omoregie and Aziken,2022). Examples of digital tools are email, video conferencing, power point, social media platforms etc. Digital tools are increasingly being used in a wide range of fields of specialization including agriculture globally (Nyarko and Kozári,2021)..

The world population is persistently increasing mounting pressure on food supplies to feed the ever increasing population in different parts of the world. To increase food production and ensure a sustainable agricultural development with its associated benefits the Nigerian government has continued to sponsor researches into different areas of agriculture. This has birthed innovations in different areas

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of agriculture. These innovations often get to the farmers through the extension agents who are very few and as a result are unable to reach the farmers scattered in different areas of the state and nation at large physically(Omoregie and Koyenikan,2020).. The extension agents are the connecting pipes between the researchers / research institutions and the farmers
(Omoregie and Aziken,2022). Different research results have shown that they(extension agents) are grossly inadequate to reach the numerous farmers scattered over the rural areas through physical contact. Digital tools when used appropriately can bridge the gap because large audience / farmers can be reached with out meeting physically. Digitalization of their operations will enhance speedy dissemination of research information from research stations to the farmers. Has extension agents in Edo State taken advantage of the digital tools in extension delivery to the farmers?. This article gives an overview of digital tools, the extent of its usage among extension agents ,factors that hinder digital tools driven socio-economic development in Edo State and various possible ways of maximizing potential benefits that the respondents can derive from the limited digital tools that are accessible to them.The findings of the study will be useful to other researchers who may want to carry out related studies.

The broad objective of the study was to ascertain the level of utilization of digital tools in extension service delivery amongst extension agents in Edo State, Nigeria. The specific objectives of the study were to:

1. examine the socio-economic characteristics of extension agents in Edo State
2. examine the awareness of digital tools among agricultural extension agents in the study area;
3. ascertained the level of utilization of digital tools among the extension agents.
4. ascertained the frequency of use of digital tools among the extension agents.

Hypothesis of the study

Ho1: There is no significant relationship between the socio-economic characteristics of agricultural extension agents and their use of digital tools

MATERIALS AND METHODS

The study was conducted in Edo state. Edo State is one of the thirty six (36) states in Nigeria and in the South South geopolitical Zone. It lies between longitude 06^0 and 06^0 43` East of the meridian and latitude $05^0$ 44` and 07^0 34` North of the equator. According to National Bureau of Statistics (2022), Edo State has a projected population of 4,777,000 at 2.5% growth rate ,an area of approximately 19,559sq km and a population density of 244.2 per sq km.

Administratively, Edo state consists of three agricultural extension zones as delineated by the Edo Agricultural Development Programme (EADP) namely; Edo South , Edo Central and Edo North. The climate is characterized by wet and dry seasons. It temperature averages about 25^0C in the wet season and 28^0C in the dry season. This favours and makes the occupation of the people to includes farming of wide varieties of crops, livestock and forestry activities.

A two stage sampling procedure was used for the study. The first stage was the purposive selection of the three Agricultural Development Programme (ADP) Zones so as to give the study a state wide coverage and ensure fair representation of the Zones.There are eighty eight(88) extension agents in edo state(43 ,28 and 17 extension agents in Edo South, Edo North and Edo Central respectively. The second and final stage was

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simple random sampling of fifty six point nine (56.9%) percent of respondents from each of the Zones, making a total of fifty(50) respondents used for the study..

Data Collection

Data for the study were collected from primary sources, i.e. extension agents. The data was obtained from the field using a structured questionnaire that was administered to the sampled extension agents.

Measurement of Variables

The Personal Characteristics were measured as follows:

Age: The respondents were asked to indicate their actual age in years.

Sex: Respondents were asked to indicate whether they are male or female. Female was coded 2 and males coded 1. This was measured on a nominal scale.

Marital Status: This was measured nominally and respondents was asked to indicate whether they are married coded 1, single coded 2, divorced coded 3 or widowed coded 4.

Household size: interval scale; was used to measure respondents' household size,

Level of Education: Ordinal values of the following categories was used to measure the respondents' educational level: OND/NCE rated 1 HND/B.Sc rated 2, MSc rated 3, and Phd rated 4 and others rated 0.

JOB experience: Respondents were asked to indicate the number of years spent as agricultural extension agents. This was measured on an interval scale.

Digital tools accessed by extension agents: This was measured on a nominal scale and respondents were asked to indicate "Yes" or "No" (a code of 2 was assigned to yes and a code of 1 to no against digital tools accessed by extension agents

Frequency of use of Digital Tools

The frequency with which they used digital tools was measured on an ordinal 4-point rating scale of 'very frequent' (coded 4), frequent (coded 3) and rarely (coded 2), and not at all (coded 1). A mean score of 2.50 and above was taken to mean that the digital tool was frequently used.

Analytic Techniques

Data obtained was subjected to descriptive and inferential statistics. The descriptive statistic tools used include frequency counts, percentages and mean scores. The inferential statistics used is logit regression. Logit regression was used to test the Hypothesis which states that "There is no significant relationship between the socio-economic characteristics of respondents and their use of digital tools". The logit regression analysis is a form of regression used when the dependent variable is dichotomous or can assume a dummy variable. The independent variables can be binary or continuous variables(Alexandra and Johnson,2020) It estimates the odd or likelihood ratio. The logit regression model is implicitly stated as:

$$Pr(Y=1/X_i) = Ln\left[\frac{Yi}{1-Yi}\right] = a+b_iX_i+\ldots+b_nX_n + U \quad .(1)$$

Where:

Ln = Natural log
$Pr(Y = 1/X_i)$ = Probability of Y occurring, given that X_i-X_n have occurred.
a = The coefficient of the constant term

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b_i-b_n = The coefficients of the independent variables
x_1-x_n = The independent variables
U = Error term or residual

The mathematical expression of the model is explicitly specified as:

$$Yi = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + U \quad (2)$$

Where:

Yi = Digital Tools Usage (Used=1, Not Used=0)

X_1 = Sex (Female=0, Male=1)

X_2 = Age (Number of Years)

X_3 = Marital Status (Married = 1, Single =2)

X_4 = Household Size (Number of persons living and feeding from the same pot)

X_5 = Level of Education

X_6 = level of experience (Years)

X_7 = Annual Income level (Naira)

e = Error Term

RESULTS AND DISCUSSION

Age

Table 1 show that majority (44%) of the extension agents in Edo State are 30 years and below. This was followed by those (30%) within the age range of 31-40 years. This implied that majority (74%) of the extension agents are in their active years, hence, they can carry out their services effectively and efficiently. This finding is similar to that of Omoregie and Koyenikan (2020), who asserted that the mean age of extension personnel working with Edo state governments were closely within 40 years of age.

Sex

Results in Table 1 show that majority (72%) of the extension agents were male while 28% were female. This implied that the agricultural extension system is dominated by males. This agree with findings of Onemolease, Ehilenboadiaye, and Omoregie (2021), who asserted that for every five (5) extension employees encountered, one (1) is a female.

Marital Status:

Most of the respondents (64%) are single and only few (36%) of them are married. This means that most of the extension agents are free from extra domestic tasks associated with marriage couples. This agrees with the findings of (Etta-Oyong *et al.,* 2022) that unmarried extension workers are freer and very agile.

Religion

The table result shows that majority (86%) of the respondents were Christians while few (14%) practiced Islamic religion. This implies that Christianity is the dominant form of religious belief system practiced by extension agents in the study area. This may be as a result of the regional variation in the religion of the country while in the northern region is not so. This result is in line with Okoedo-

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Okojie (2015) who stated that the south-south region of Nigeria is dominated by Christians.

Table 1: Socio-Economic Characteristics of Extension Agents

Characteristics	Options	Frequency	%	Mean
Age range (years)	30 & below	22	44.00	
	31-40	15	30.00	
	41-50	8	16.00	
	>50	5	10.00	
	Total	50	100.00	35
Sex	Female	14	28.00	
	Male	36	72.00	
	Total	50	100.00	
Marital Status	Single	32	64.00	
	Married	18	36.00	
	Total	50	100.00	
Religion	Islam	7	14.00	
	Christian	43	86.00	
	Total	50	100.00	
Educational level	HND/BSc	47	94.00	
	MSc	3	6.00	
	Total	50	100.00	
Household size	1-3	39	78.00	
	4-6	7	14.00	
	7-9	4	8.00	
	Total	50	100.00	3
Working status	Part-time	5	10.00	
	Full time	45	90.00	
	Total	50	100.00	
LEVEL	2	2	4.00	
	4	8	16.00	
	8	37	74.00	
	10	1	2.00	
	14	2	4.00	
	Total	50	100.00	
Job experience range (years)	1-5	46	92.00	
	6-10	2	4.00	
	>10	2	4.00	
	Total	50	100.00	3

Education

The result shows that majority (94%) of the extension agents in the study area were well educated with a minimum of HND/B.Sc. This signifies that the literacy level of extension workers in Edo State is high. This indicates that a significant portion of extension workers possess a moderate level of expertise and experience in the field of agriculture. This can contribute positively to their understanding

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and ability to apply digital tools in dissemination of innovation information. This corroborates the findings of Olaolu *et al* (2018), which revealed that extension personnel with high educational standard can skilfully use any of the digital tools available to them.

Household size

The result shows that majority (78%) of the respondents in the study area had approximately 3 persons as the household size .This shows that respondents used in this study had moderate household size. This implied that respondents has less care/financial burden and as a result can easily acquire and use digital tools in their operations.

Working Status

Majority (90%) of the respondents were full time workers while few (10%) were part time workers. This is an indication that most of them were employed into agricultural extension services as they were young and reliable .Full time staff usually have higher allowance than part time staff. This implied that they can make high financial investment in digital tools.

Level Attained

Table result shows that majority (74%) of the respondents were on level 8. This shows that they are fresh employee because level 8 is the starting grade for HND/BSc graduates. These workers are well-equipped to provide farmers with new digital tools for valuable information and guidance on improving their agricultural practices (Davis *et al.,* 2021).

Job Experience (years)

Table 1 indicated that majority (92%) of the respondents had been working for 1-5 years. This indicates that most of the extension workers were new recruit in the study area. This category of new staff may have limited experience on how digital tools can be applied in extension work. Extension staff with good working experience can make their wealth of experience bear on their jobs as it has the tendency of making them to be more receptive to better ways of using digital tools in rendering essential services as well as in the disseminating of their extension obligations to farmers. This agrees with Omoregie and Koyenikan (2020), whose reported the need for regular training of extension agents, especially the new recruits, to determine their areas of preparedness and where they needed further training.

Digital Tool Awareness of Respondents

Table 2 revealed that all (100%) the 'extension agents' were aware of television, radio, mobile phones, audio visuals aids, emails, whapsapp, facebook, tiktok, instagram and youtube. The result agreed with the findings of Omoregie and Aziken (2022) that most extension agents in the government sector were aware of available digital/ICT tools. Omoregie and Aziken(2022) research findings also agreed with the findings that extension agents were aware of digital tools in information delivery to farmers.

Table 2: Digital Tool Awareness of Respondents

Digital tool	Aware	
	Frequency	%
Television	50	100.00
Radio	50	100.00
Mobile phones	50	100.00
Audio visuals aids	50	100.00
Emails	50	100.00
Blogs	46	92.00
E-Journals	34	68.00
Whatsapp	50	100.00
Facebook	50	100.00
Tiktok	50	100.00
Instagram	50	100.00
YouTube	50	100.00

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LinkedIn	36	72.00
Web publishing	46	92.00
Telegram	45	90.00
Zoom	45	90.00

Ability to Use Digital Tools

Table 3 shows that a significant proportion of respondents were well able to use most of the listed digital tools. Digital tools like television (Mean=2.84),, radio(Mean=2.84), mobile phones(Mean=2.84) among others show consistently high ability levels across respondents with mean higher than 2.0. This indicates that most of the respondents were able to use the various digital tools available in the study area. This is similar to the findings of Nyarko and Kozári(2021).

Table 3: Ability to Use Digital Tools

Digital tools	Highly able		Able		Not able		Total	
	Freq	%	Freq	%	Freq	%	Mean*	SD
Television	42	84	8	16			2.84	0.4
Radio	42	84	8	16			2.84	0.4
Mobile phones	42	84	8	16			2.84	0.4
Emails	42	84	8	16			2.84	0.4
Facebook	42	84	8	16			2.84	0.4
Tiktok	37	74	13	26			2.74	0.4
Audio visuals aids	35	70	15	30			2.7	0.5
whatsapp	38	76	8	16	4	8	2.68	0.6
Instagram	33	66	17	34			2.66	0.5
YouTube	33	66	13	26	4	8	2.58	0.6
Telegram	26	52	24	48			2.52	0.5
Zoom	26	52	24	48			2.52	0.5
LinkedIn	28	56	13	26	9	18	2.38	0.8
Web publishing	19	38	20	40	11	22	2.16	0.8
E-Journals	14	28	27	54	9	18	2.1	0.7
Blogs	19	38	15	30	16	32	2.06	.8

**Able (mean > 2.00)*

Digital Tool Frequency of Use

Table 4 shows the frequency of usage of digital tools by extension workers in the study area. The results showed that majority of respondents used phone(Mean=3.00).

Television (Mean=2.86), Emails(Mean=2.86), whatsap (Mean=2.86), facebook(Mean=2.86) etc frequently.While Instagram, TikTok, (Mean=1.82), and YouTube (Mean=1.28),E-journals (Mean=1.14), and others were not frequently used. This result is similar to the work of Omoregie and Aziken (2022) who reported that extension workers had high usage of radio, television and mobile phone, while only a few uses other digital tools facilities.

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Table 4: Digital Tool Frequency of Use.

	Very frequently		Frequently		Rarely		Total	
Digital tools	Freq	%	Freq.	%	Freq.	%	Mean*	SD
Mobile phones	50	100.00					3.00	.0
Television	43	86.00	7	14.00			2.86	.4
Emails	43	86.00	7	14.00			2.86	.4
Whatsapp	43	86.00	7	14.00			2.86	.4
Facebook	43	86.00	7	14.00			2.86	.4
Instagram	12	24.00	29	58.00	9	18.00	2.06	.7
Audio visuals aids	12	24.00	24	48.00	14	28.00	1.96	.7
Zoom	7	14.00	34	68.00	9	18.00	1.96	.6
Tiktok	7	14.00	27	54.00	16	32.00	1.82	.7
Radio	16	32.00	5	10.00	29	58.00	1.74	.9
Telegram	7	14.00	20	40.00	23	46.00	1.68	.7
YouTube	7	14.00	19	38.00	24	48.00	1.66	.7
Web publishing	12	24.00	7	14.00	31	62.00	1.62	.9
LinkedIn	7	14.00	12	24.00	31	62.00	1.52	.7
Blogs	7	14.00	0	.00	43	86.00	1.28	.7
E-Journals			7	14.00	43	86.00	1.14	.4

*Frequent (mean > 2.00)

Relationship Between the socio-Economic Characteristics of Agricultural Extension Agents and their Usage of Digital Tools

Logit regression was used to test this relationship. The Wald Chi-Square statistics ($p>0.05$) in the table below shows that none of the socio-economic characteristics showed statistically significant relationships with digital tool usage by the extension agents. The odd ratios provide insights into the relative change in the odds of using digital tools associated with a one-unit change in each predictor variable. However, since none of the coefficients were statistically significant, the odds ratios were not meaningful in this context. Both the Model Chi-square (6.22) and Goodness-of-Fit Chi-square statistics(26.73) have p-values greater than 0.05, indicating that the model does not significantly differ from the data. The Nagel kerke Pseudo R-Square value of 0.175 suggests that the model explains only a moderate amount of the variance in digital tool usage among extension agents. The logit regression result showed that there was no significant relationship between the social economic characteristics of respondents in the study area and their usage of digital tools.

Table 5: Parameter Estimates relationship between the socio-economic characteristics of agricultural extension agents and their usage of digital tools (logit regression)

Parameter	**Coefficient (B)**	**Wald Chi-Square**	**df**	**Prob. level**	**Odd ratio**	**Remark**
Constant	0.346	0.012	1	0.913	1.413	NS

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Age	0.025	0.283	1	0.595	1.025	NS
Sex	-1.087	1.321	1	0.250	.337	NS
Marital status	-2.195	1.203	1	0.273	.111	NS
Educational level	1.483	0.444	1	0.505	4.406	NS
Household size	0.199	0.154	1	0.695	1.220	NS
Working status	-0.749	0.286	1	0.593	.473	NS
Level	-0.288	1.519	1	0.218	.750	NS
Experience	0.081	0.084	1	0.772	1.084	NS

Model Chi-square = 6.22; df=8, p>0.05
Goodness-of-Fit Chi-Square = 26.73; df = 22, p>0.05
NagelkerkePseudo R-Square = 0.175

CONCLUSION

The study results shows that majority of respondents are male, single ,educated and in their productive age. The study also showed that most of the respondents were full time staff. The result revealed that respondents were aware of most digital tools availability. Result also showed that a significant proportion of respondents were well able to use most of the listed digital tools. However, the frequency of usage of some of them (Instagram, TikTok, YouTube, E- journals) were very low.

Based on the finding of the study, the following recommendation are made:

1. Government agencies, NGOs, and private sector partners to develop and promote affordable digital tools tailored to the needs of extension workers and farmers in Edo State so as to increase their productivity.

2. They should encourage the extension agents to use modern digital tools like Instagram, TikTok,YouTube and E- journals that are currently not frequently used.

3. Government and stakeholders should organise training programs to enhance the digital literacy skills of extension workers.in the usage of blogs, linkedin, web publishing, E-journals and youtube.

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