Determinants in the Utilization of Information and Communication Technology (ICT) Tools Among Poultry Farmers in Rivers State, Nigeria

Igiri, R., & Elenwa, C.O.
Department of Agricultural Extension and Rural Development,
Rivers State University, Port Harcourt, Nigeria.
Corresponding Author Email: rex.igiri1@ust.edu.ng
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Abstract
The study examined the determinsnts in the use of Information and Communication technology (ICTs) among poultry farmers in Rivers State. Specifically, the study sought to: ascertain the factors influencing the utilization of Information and Communication Technology (ICT) tools among poultry farmers; determine the perceived effect of utilizing Information and Communication Technology (ICT) tools on poultry production; and ascertain the perceived constraints in utilizing Information and Communication Technology (ICT) among poultry farmers in the study area. A total of three hundred (300) questionnaires were distributed and used for the study. Data were analyzed using a four point rating scale likert scale and ANOVA. Result showed that the factors influencing ICT tools utilization were distance to the market, age, sex, education, farming experience, income and occupation at a P≤0.05. The effects of ICT utilization were; facilitate information exchange among farmers, ease in purchase of farm inputs, easy accesibility of information and increased income due to new methods learnt. The factors militating against the utilization of ICT were infrastructural factor such as frequent power failure (0.654), lack of ICT policies to enhance ICT development in rural areas (0.810), concentration of modern ICT tools in urban areas (0.552), lack of awareness on the new and available ICT tools for agriculture (0.426), poor network coverage (0.421) and poor maintenance of ICT hardware (0.712); Eeconomic factor such as high cost ICT tools (0.408), illiteracy of farmers (0.681), high cost of maintenance (0.547), few agricultural programmes aired on radio/television (0.508), poor knowledge on technical know-how (0.709), poverty (0.571) and lack of ICT software and hardware (0.662) and psychological factor such as fear that things will go wrong in the use of ICT (0.531), lack of confidence in operating ICT tools (0.522) and our culture and tradition are not in support of ICT usage (0.689). Result of the ANOVA shows that the utilization of ICTs by poultry farmers do not significantly differ among the agricultural zones in the study area. The study recommends that the State government should provide the basic infrastructural facilities such as power supply that will enable poultry farmers utilize ICT.

Keywords: *Determinant Factors, Utilization, ICT Tools, Poultry Farmers*

Introduction

Information and Communication Technologies are playing a fundamental role in stimulating and disseminating agricultural information that is essential for enhancing farming (Kante *et al*., 2016). According to Okorie et al (2021), around the world, information and communication technology

in agriculture has been identified as the key factor in the sector's growth. As a result, this specifies that farmers' need for relevant and timely information can be met using ICT-based information sources to process and transmit information for farmers (Serbulova *et al., 2019*). The agriculture sector remains a key part of the Nigerian economy despite oil exploration in the past decades, providing a substantial source of livelihood (Food and Agriculture Organization (FAO) 2020). It has always played a key role in the socioeconomic development of emerging countries such as Nigeria (Elenwa et al, 2023). Despite the fact that agriculture is a rural activity, it accounted for nearly 22% of Nigeria's GDP, compared to 9.5 percent for oil and gas, 9.7 percent for manufacturing, 3.8 percent for financial services, and 16.1 percent for commerce. Furthermore, the agricultural industry continues to be Nigeria's greatest employer of labour, employing more than a third (86.4%) of the country's workforce (Pricewaterhouse Coopers Nigeria, 2020). Crop farming, livestock rearing, fishing, and forestry dominate this sector in the country.

Nigeria's livestock business is a vibrant and profitable part of the overall economy, with yearly growth of 12.7% (FAO, 2020). In terms of physical area, the global livestock sector spans around 30% of the world's unfrozen terrestrial surface, with pasture and other livestock demands occupying about 30.3 million hectares (Statista, 2020). In terms of financial assets, the sector is projected to be worth $1.4 trillion globally, with Nigeria's livestock sector valued at $78 billion (FAO, 2020). With 22 percent of GDP in 2020, this industry is a vital contributor to economic growth and development in the country's agriculture sector (National Bureau of Statistics (NBS) 2020; FAO, 2020; STATISTA, 2021). Poultry occupies a vital position among livestock sector because of its performance and tremendous potential for caloric needs, crop supplementation, and economic expansion (Ajuwa et al. 2023). With a growing national population of 16 million smallholder families, poultry continues to play an increasingly important role in Nigeria's economy (FAO, 2020). Social prestige, financial revenue, manure, insurance, and savings are just a few of the benefits of poultry to people's livelihoods (FAO, 2020). According to Ewubare and Ozar (2018), poultry production in Nigeria is dominated by small scale farmers, who collectively generate roughly 90% of the total national poultry production and individually rear less than 3,000 birds with a three-month payback period for broiler production. Though the rapid development in ICTs have a huge potential of improving poultry farmers' information access, and hence yields and profitability through the adoption of productivity enhancing technologies and improved access to market information (Elenwa et al 2022), yet empirical evidence on their usability, factors affecting usage, challenges addressed facing poultry farmers in accessing agricultural information is lacking in Rivers State (Albert, 2013; Albert et al 2014). It is against this background that this study seeks to assess the use of Information and Communication technologies (ICTs) and its effect by poultry farmers in Rivers State.

Objective of the Study

i. ascertain the factors influencing the utilization of Information and Communication Technology (ICT) tools among poultry farmers in the study area;
ii. determine the perceived effect of utilizing Information and Communication Technology (ICT) tools on poultry farmers; and
iii. ascertain the perceived constraints in utilizing Information and Communication Technologies (ICTs)among poultry farmers in the study area.

$H0_1$: There is no significant difference in the factors influencing the utilization of ICTs tools by poultry farmers among the agricultural zones in the study area.

Methodology

The study on assessment of the use of Information and Communication Technologies (ICTs) and its effect on poultry farmers' was undertaken in Rivers State, one of the thirty-six states that make up Nigeria's federal republic. Rivers State is located in the geopolitical region of the south-south. The Niger Delta Region is made up of several states. Rivers State is bordered on the north by Imo, Abia and Anambra states, on the east by Akwa Ibom state, and on the west by Bayelsa and Delta states. The state is situated between latitude 4"30^{0}N and 5"45^{0}N approximately longitude 6"30^{0}E and 7"30^{0}E, and spans 11,077 km^2 (4,277 sq mi), making it Nigeria's 26th largest state (Google Earth). Port Harcourt, the State capital, is a bustling metropolis that serves as Nigeria's oil industry's commercial hub (Rivers State Government. The people that live along the coast are mostly fishermen and traders. Aside from fish, periwinkles (*Tympanotonus fuscatus*) and oysters (*Crassostrea gasar*) are among the aquatic fauna found in this area. Periwinkle, oysters, and shrimp are the most common aquatic resources harvested and traded by fishermen. Also, apart from fishing, there are a lot of poultry farmers resident in the state. There are a total of one thousand, four hundred and fifty four (1,454) registered poultry farmers. However, the population of poultry farmers in the twelve LGAs were purposively selected based on stock size of not less than 100 birds for this study to represent the study population which is one thousand, one hundred and ninety eight (1,198) poultry farmers. A multi-stage sampling procedure was used in this study. The multi-stage sampling procedure was chosen because it allows for effective and equal representation of all the units within the study area. The sampling procedure was in stages, and the peculiarities of characteristics are taken into consideration at all the sampling stages for equal representation. A total of three hundred (300) poultry farmers were selected to form the sample size for the study. To arrive at this figure (300), Taro Yamane's formula was employed: Data for this study were generated from primary sources such as questionnaire, personal observation and interview schedule. . Objectives 1, 2 and 3 were achieved using a four-point rating scale with options; To a very Great Extent = 4, To a Great Extent = 3, To a Little Extent = 2, To a very little Extent = 1 for objective 1 and 2; very severe = 4, severe = 3, less severe = 2 and not severe = 1 for objective 3. The values assigned for the four-point were added to get ten (10) which was divided by 4 to get 2.5 resulting in a decision rule of 2.50.

Results and Discussion

Factors influencing the utilization of Information and Communication Technology (ICT) tools Among Poultry Farmers in the Study Area

Table 1 shows the logistic resgression result of factors influencing the utilization of ICT among poultry farmers in the study area.

Table 1: Logit Regression Result of Factors influencing the utilization of Information and Communication Technology (ICT) tools Among Poultry Farmers

Variables	B Statistic	Standard Error	P-Value
Distance to market	0.693	0.329	0.035**
Education	1.235	0.332	0.000***
Experience	-0.836	0.248	0.001***
Income	2.565	0.711	0.000***
Cooperative	0.004	0.136	0.977
Occupation	-1.725	0.282	0.000***

Age	-0.870	0.255	0.001***
Constant	5.431	1.797	0.003***
Cox & Snell R Square	0.524		
Pseudo R Square	0.730		
Chi-Square	223.572		

Source: Researcher's computation with SPSS 25.0, detailed in Appendix
****significant at p≤ 0.05, *** significant at p≤ 0.01**

From the Logit regression result in Table 1, the Pseudo R^2 was 0.730 (73.0%) which shows that the combined effect of the independent variables explained 73.0% of items relating to usage of ICT tools. The remaining 27% were caused by other factors not included in the model. The factors considered were distance to the market, age, sex, education, farming experience, income, cooperative membership and occupation. Furthermore, from the results obtained from the logistic regression analysis, the following interpretations can be deducted. The analysis showed that the following factors; distance to the market, age, sex, education, farming experience, income and occupation significantly influenced ICT tools utilization. The coefficient of education (1.235) was positively signed and significantly influenced the use of ICT tools. This implies that poultry farmers with higher level of educational qualification utilized ICT tools compared to those with lower level of education. The positive influence of education on the use of ICTs is that education creates a favourable mental attitude for the acceptance of new technology such as ICTs. It can therefore be inferred that the more educated the poultry farmers, the more likely they will choose ICTs for their agricultural information needs. This assertion was in line with the finding of Makwin *et al* (2024) in which educational attainment had significant relationship with use of ICT among Cowpea Farmers in Alkaleri Local Government Area of Bauchi State, Nigeria. The coefficient for distance to market (0.693) was positively signed and significantly influenced ICT tools utilization. This implies that, as distance to market increases, the utilization of ICT also increases. The coefficient of farming experience (-0.836) was negative and statistically significant at 1% level. This implies that poultry farmers with less experience tend to utilize ICT more than the ones with more years of experience. The negative sign implies that as farmers get older and increases in years of farming, they tend to adhere strictly to farming practices that they are used to. This is similar to the finding of Idu et al (2023) that having fewer years of experience predicted increased usage of ICT in Kuje Area Council of FCT, Abuja. The coefficient for occupation (-1.725) was negatively signed and significantly influenced ICT utilization. This implies that being involved in other forms of occupation decreases the use of ICT. The coefficient of age (-0.870) was negative and significant at 1% level. This implies that as a poultry farmers' age increases, the use of ICT decreases. The implication of this is that younger farmers are more likely to use ICT facilities in accessing information than older farmers who were characterized as late adopters or laggards. This finding corroborates the finding of Michael, Garba and Hamidu (2023) who reported a negative relationship between age and ICT utilization among hungry rice *(ACCHA)* farmers in Plateau State, Nigeria. This finding disagrees with the study of Abdulshakur *et al.* (2019) who reported positive and significant relationship between age and ICT usage among maize farmers in Giwa Local Government Area of Kaduna State, Nigeria. The coefficient of income was positive (2.565) and significantly influenced ICT utilization at 1% level. This implies that as income of poultry farmers increases, the utilization of ICT tools will also increase. The coefficient of cooperative membership (0.004) was positive and insignificant at 5% level. This is an indication that being a member of cooperative society can have positive influence on ICT utilization.

Effect of utilizing Information and Communication Technology (ICT) tools Among Poultry farmers in Rivers State

The mean value of effect of utilizing Information and Communication Technolog (ICT) tools among poultry farmers in the study area using a decision rule of mean 2.50 are shown in Table 2.

Table 2: Perceived Effect of utilizing Information and Communication Technology (ICT) tools Among Poultry farmers in Rivers State

	Zone 1 (n=145)			Zone 2 (n=46)			Zone 3 (n=109)			Pooled (n=300)		
ICT Tools	Mean	SD	Remark	Mean	SD	Remark	Mean	SD	Remark	Mean	SD	Remark
Facilitate information exchange among farmers	3.76	0.429	E	3.74	0.444	E	3.82	0.389	E	3.78	0.417	E
Increased income due to new methods learnt	3.12	0.696	E	3.15	0.420	E	3.21	0.668	E	3.16	0.650	E
Increased customer as a result of advertising my farm	1.93	0.991	LE	1.96	1.053	LE	2.17	0.977	LE	2.02	0.998	LE
Increased profit due to increase in my income	2.57	0.664	E	2.39	0.682	LE	2.65	0.699	E	2.57	0.683	E
Acquiring information from extension is now easier due to better communication	1.75	0.693	LE	1.89	0.737	LE	1.67	0.782	LE	1.74	0.734	LE
Information on agencies involved in Agric facilitating is easier to get through the use of ICT tools	2.85	0.930	E	2.48	1.049	LE	2.94	0.905	E	2.82	0.950	E
Can help to check climate change	3.16	0.879	E	3.02	0.906	E	3.25	0.841	E	3.17	0.870	E
Enhance food security	2.06	0.818	LE	2.11	0.948	LE	2.21	0.817	LE	2.12	0.839	LE
Easy accesibility of information	3.36	0.509	E	3.37	0.488	E	3.48	0.537	E	3.40	0.518	E
Ease in marketing of products	2.19	0.645	LE	2.04	0.469	LE	2.24	0.651	LE	2.18	0.625	LE
Access to credit facility	2.88	0.957	E	2.89	1.038	E	2.66	0.974	E	2.80	0.978	E
Information on disease prevention and cure	2.88	0.964	E	3.09	0.985	E	2.67	0.991	E	2.83	0.984	E
Acquisition of modern poultry technique	3.03	1.047	E	3.22	1.052	E	2.90	1.036	E	3.01	1.046	E
Ease in computing cost of production	2.28	0.805	LE	1.91	0.694	LE	2.38	0.779	LE	2.26	0.792	LE
Ease in purchase of poultry inputs	3.50	0.668	E	3.28	0.779	E	3.45	0.713	E	3.45	0.704	E
Increased knowledge of market price for produce	2.89	0.746	E	2.72	0.911	E	2.74	0.763	E	2.81	0.781	E
Grand Mean	2.76	0.78		2.70	0.78		2.78	0.78		2.76	0.78	

Source: Field survey, 2024 Decision Means ≥ 2.50 = Effective (E) < 2.50 = Less effective (LE)

Table 2 shows the perceived effect of ICT tools utilization on poultry production activities in the study area. The respondents showed positive response to the effects of the use of ICT tools. From the table, the respondents in the three zones agreed to the following: facilitate information

exchange among farmers ($\bar{x}$=3.76, $\bar{x}$=3.74 and $\bar{x}$=3.78) for zones 1, 2 and 3 respectively, ease in purchase of farm inputs ($\bar{x}$=3.50, $\bar{x}$=3.38 and $\bar{x}$=3.45) for zones 1, 2 and 3 respectively, easy accesibility of information ($\bar{x}$=3.36, $\bar{x}$=3.37 and $\bar{x}$=3.48) for zones 1, 2 and 3, respectively, can help to check climate change ($\bar{x}$=3.16, $\bar{x}$=3.02 and $\bar{x}$=3.25) for zones 1, 2 and 3, respectively, increased income due to new methods learnt ($\bar{x}$=3.12, $\bar{x}$=3.15 and $\bar{x}$=3.21) for zones 1, 2 and 3, respectively, acquisition of modern farming technique ($\bar{x}$=3.03, $\bar{x}$=3.22 and $\bar{x}$=2.90) for zones 1, 2 and 3 respectively, increased knowledge of market price for produce ($\bar{x}$=2.89, $\bar{x}$=2.72 and $\bar{x}$=2.74) for zones 1, 2 and 3, respectively, information on disease prevention and cure ($\bar{x}$=2.88, $\bar{x}$=3.09 and $\bar{x}$=2.67) for zones 1, 2 and 3, respectively, access to credit facility ($\bar{x}$=2.88, $\bar{x}$=2.89 and $\bar{x}$=2.66) for zones 1, 2 and 3, respectively, information on agencies involved in Agric facilitating is easier to get through the use of ICT tools ($\bar{x}$=2.85 and $\bar{x}$=2.94) for zones 1 and 3, respectively, and increased profit due to increase in my income ($\bar{x}$=2.57 and $\bar{x}$=2.65) for zones 1 and 3, respectively. This finding is in agreement with the study of Effiong and Aboh (2019) who stated that Information and Communication Technologies are the major sources of information necessary for the determinant of adoption of improved rubber production technologies among farmers in Akwa Ibom State, Nigeria. The pooled grand mean of 2.76 shows that ICT tools were beneficial to poultry farmers in the study area, while the standard deviation of 0.78 signifies that all respondents' perceived effect of ICT tools did not vary much from the mean scores.

Factors Militating Against the Utilization of Information and Communication Technologies (ICTs) Among Poultry Farmers in Rivers State

Table 3 showed all the components that were extracted from the analysis based on the response of respondents on factors militating against utilization of Information and Communication Technologies (ICTs) among poultry farmers in Rivers State. The rotated component matrix, also known as the loadings, is the main output of the Principal Component Analysis. Three (3) militating factors were extracted based on the response namely; infrastructural factor (factor 1), economic factor (factor 2) and psychological factor (factor 3). Using the decision rule of loaded factors ≥ 0.30 (Hair, Hult et al, 2017), the following factors were accepted as factors of high loadings; loaded high under the infrastructural factor l were; frequent power failure (**0.654),** lack of ICT policies to enhance ICT development in rural areas (**0.810),** concentration of modern ICT tools in urban areas (**0.552),** lack of awareness on the new and available ICT tools for agriculture (**0.426),** poor network coverage (**0.421)** and poor maintenance of ICT hardware (**0.712).** Under economic factor 2, the following factors were accepted as factors of high loadings. High cost ICT tools **(0.408),** illiteracy of farmers (**0.681),** high cost of maintenance (**0.547),** few agricultural programmes aired on radio/television (**0.508), p**oor knowledge on technical know-how (**0.709),** poverty (**0.571)** and lack of ICT software and hardware (**0.662)** and finally, under psychological factor 3, the factors were; fear that things will go wrong in the use of ICT (**0.531)**, lack of confidence in operating ICT tools (**0.522)** and our culture and tradition are not in support of ICT usage (**0.689).** From the factor analysis, infrastructural factors such as frequent power failure**,** lack of ICT policies to enhance ICT development in rural areas**,** concentration of modern ICT tools in urban areas**,** lack of awareness on the new and available ICT tools for agriculture**,** poor network coverage and poor maintenance of ICT hardware. The second millitating factor was economic factors such as; high cost ICT tools**,** illiteracy of farmers**,** high cost of maintenance**,** few agricultural programmes aired on radio/television**, p**oor knowledge on technical know-how**,** poverty and lack of ICT software and hardware. Finally, psychological factors 3 were; fear that things will go wrong in the use of ICT, lack of confidence in operating ICT tools and our culture and tradition are not

in support of ICT usage. This findings agrees with that of Albert (2014) who equally revealed in their study that illiteracy and poverty/lack of financial resources were major constraint in the use of ICT among farmers in Rivers state.

Table 3: Rotated Component Matrix Based on the Responses of Women and Men on Factors Militating against Utilization of ICT Among Poultry Farmers

	Components		
Militating Factors	**Factor 1 (Infrastructural Factor)**	**Factor 2 (Economic Factor)**	**Factor 3 (Psychological Factor)**
Frequent power failure	**0.654**	-0.005	-0.150
High cost ICT tools	0.075	**0.408**	-0.503
Lack of ICT policies to enhance ICT Development in rural areas	**0.810**	0.005	0.209
Concentration of modern ICT tools in urban areas	**0.552**	-0.384	0.262
Illiteracy of farmers	0.021	**0.681**	0.127
High cost of maintenance	0.361	**0.547**	0.243
Fear that things will go wrong in the use of ICT	-0.064	0.076	**0.531**
Lack of confidence in operating ICT tools	-0.333	-0.496	**0.522**
Few agricultural programmes aired on radio/television	-0.299	**0.508**	0.015
Poor knowledge on technical know-how	-0.067	**0.709**	0.119
Our culture and tradition are not in support of ICT usage	-0.299	0.135	**0.689**
Lack of awareness on the new and available ICT tools for agriculture	**0.426**	-0.099	-0.099
Poverty	-0.088	**0.571**	-0.222
Poor network coverage	**0.421**	-0.243	-0.645
Lack of ICT software and hardware	-0.043	**0.662**	-0.509
Poor maintenance of ICT hardware	**0.712**	-0.204	0.001

Source**: Field Survey, 2024* ***Rotated component matrix (0.30)

There is no significant difference in the factors influencing the utilization of ICTs tools by poultry farmers among the agricultural zones in the study area.

Table 4: Analysis of Variance Result for difference in the factors influencing the utilization of ICTs tools by poultry farmers among the agricultural zones in the study area

Source of Variation	**SS**	**Df**	**MS**	**F**	**P-value**
Between Groups	0.761	2	0.380	0.205	0.815
Within Groups	553.791	298	1.858		
Total	554.551	300			

Where: ss = sum of squares; df= degree of freedom; ms= mean squares F=F calculated
Source: Researcher's computation with SPSS 23.0

The difference in the factors influencing the utilization of ICT tools among poultry farmers in the agricultural zones were subjected to analysis of variance (ANOVA). Result in Table 4 shows F calculated (0.205) and p-value of (0.815). Given the fact that the p-value is greater than α (0.05), the null hypothesis ($H0_3$) which states that there is no significant difference in the factors influencing the utilization of ICTs tools among poultry farmers among the agricultural zones in the study area was accepted. This implies that poultry farmers in the three agricultural zones had the same factors influencing their utilization of ICT tools. Since the P-value (0.815) was greater than 0.05 at F-cal of 0.205, it indicated that the variable of factore influencing the utilization of ICT tools were significant; they do influence the poultry farmers to use ICT tools in the study area. This finding agreed with the study of Fawole (2024) who identified income, years of experience and education as factors influencing the use of ICT tools among maize farmers in Kaduna state.

Conclusion And Recommendations

The study concluded that poultry farmers in Rivers state are influrenced by factors like distance to the market, education, age, experience, cooperative membership and occupation. Facilitation of information exchange among farmers, ease in purchase of farm inputs and easy accesibility of information were among the benefits poultry farmers derived from the use of ICT tools. Frequent power failure, lack of confidence in operating ICT tools and lack of internet access in rural areas were among the major factors militating against the use of ICTs. Among poultry farmers in the study area. It was recommended tha since the respondents' educational level had a significant positive influence on the utilization of ICTs, it might be advised that Extension agents run a number of awareness programmes, sensitization and training workshop for the uneducated and less-educated farmers.

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