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Utilization of Cyber Extension Technologies among Fish Farmers in Osun State Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The study analyzed the utilization of cyber extension technologies among fish farmers in Osun state Nigeria. Structured interview schedule was used to elicit primary data from 160 fish farmers selected through simple random sampling. Findings revealed that the mean number of ponds owned by the respondents was 5ponds. The mean years spent in formal schooling and fish farming experience were 15.5years and 6.8years respectively. There was high utilization of smartphone (Mean = 2.1) and laptop (Mean = 1.2) for cyber extension information on fish production. There was positive and significant relationships between respondents' age (r= 0.566; p ≤ 0.05); household size (r=0.598; p ≤ 0.05); number of years spent schooling (r= 0.532; p ≤0.05); number of ponds owned (r= 0.268; p ≤ 0.05), annual income (r= 0.525; p ≤ 0.05) and utilization level of cyber extension technologies among fish farmers. The study concludes that high utilization of cyber extension technologies of smartphone and labtop are highly beneficial to obtaining fish production information The study recommended that fish farming information packages on cyber extension should address the identified challenges of poor technical know-how, this will assist farmer to improve their knowledge and use better strategies for fish production.

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Keywords: Cyber extension; extension information; technologies; fish; fish farmers.

1. INTRODUCTION

Cyber extension also known as E-Extension means utilization of capacity of online networks, computer communication and digital interactive multi-media to facilitate the dissemination of technology. It's the most revolutionary method of agricultural extension teaching methods. Due to its convenience, the latest technologies invented in the other end of the world will reach in a minute to the local farmers [1]. All the internet tools for developing and accessing Agricultural Information constitute the tools of Cyber Extension. They are: Email; Expert systems providing information on agricultural production; Internet browsing for extension information; Video conferencing; Call centers and Satellite communication networks; News and Discussion groups. There are three systems developed for cyber extension which are: online consultation system -web consultation-, hand phone -based internet system-, and Android technology -based smart telephone [2]. Amin et al. [3] stated that development of cyber extension may keep the flow of information fast, so that it increases the farmers' accessibility to obtain needed information. It can also serve as the center of data service and supervision information to the farmers.

Contrary to Food and Agriculture Organization (FAO) standard of one extension agent to 800 farmers, Nigeria utilize 14, 000 farm extension workers in the country with a ratio of one extension agent to 10, 000 farmers, based on study carried out on Agricultural Performance Report (APR), 2017/2018 conducted by National Agriculture Extension Services (NAES) [4]. Similarly, Udegbunam [5] cited The African Seed Access Index (TASAI) 2020 report which placed Nigeria at the lowermost of the extension to farmers' ratio index in Africa. All this suggested a lapse in the work of extension personnel to reach teeming Nigeria farmers with latest agricultural innovations. As a result of these shortfall, cyber extension is significant to bridge the gap since most of the farming households access mobile phone in Nigeria.

Cyber extension is a necessity to farmers due to critical needs of information relating to weather projecting, forewarning of diseases and pests, input prices, insurance and market oppourtunities which are important for the development of agriculture in general. Prominent bottlenecks of cyber extension as stated by Hettige [6] includes fake information, information overload, difficulty in adaptation of technologies to local environment, poor access to technologies on the internet and problem of high data cost and internet accessibility. Guntoro, Qui, and Triatmojo [7] revealed that cyber-extension also has some disadvantages such as its uneven distribution to rural areas. Not every village has cyber extension facilities, so the farmers have to go to other places to access it. Also not every villagers can adapt to technology development because of its lack of infrastructures such as limited electrical power and poor internet connection.

Cyber extension is not limited to crop and livestock production but it encompasses other aspect of agriculture such as fish farming. Fish is an essential source of food in Nigeria; a visit to the typical Nigerian market will present one with various fishery products, from fresh live catfish in plastic buckets to frozen fish, roasted fish, dry fish, and many more. There are enormous markets for fish farmers in Nigeria, although farm location, fish types and quality are major factors for fish sale.

In Nigeria fish industry, domestic production only meets about 40% of the demand for fish. Adedotun [8] stated that data made available by the World Bank revealed that Nigeria produced about 40% of Nigeria's total annual fish demand. The rest of 60% of demand is met through fish importation. Consequently, there is a huge market for intending fish farmers in the country. Catfish is the most farmed fish species in Nigeria. According to the Gross Domestic Product (GDP) data released by the National Bureau of Statistics (NBS) for Q1 2021, the fisheries sector had a 3.24% contribution to the country's GDP. This was a positive indicator for the fisheries sector, which had a -3.60% and -2.07% growth contribution in Q4 and Q3 2020.

In a study conducted by Adeyongo et al. [9], constraints to the utilization of cyber extension discovered were: economic problem; twitter, YouTube and email poor usages; infrastructural problem and problem of funding extension activities involving in use of cyber extension.

Also, Ogunremi and Olatunji [10], major findings to the problems of fish production in Nigeria were: problem of technology dissemination,

inaccessibility to credit facility, high costs of technologies, erratic power supply and poor marketing structure. In the report of Ibanga [11] problems to fish production were fish farming wastes (water pollution inclusive) which constitutes health threats to public environment; poor technology utilization; fingerlings insufficiency; procedural constraint and management.

This study aimed to assess the utilization of cyber extension tools by fish farmers in Osun State. Specifically it determined awareness of Cyber extension technologies; identified various fish farming information sourced through the use of cyber extension; determined level of utilization of cyber extension technologies for fish farming information; examined constraints encountered and ascertained the benefits associated with utilizing cyber extension technologies for obtaining fish farming information.

2. METHODOLOGY

This study was carried out in Osun state Nigeria. Osun State is an inland state in south-western Nigeria. Its capital is Osogbo. It is bounded in the north by Kwara State, in the east partly by Ekiti State and partly by Ondo State, in the south by Ogun State and in the west by Oyo State. It was created in 1991 from part of the old Oyo State. The state's name is derived from the River Osun, the venerated natural spring that is the manifestation of the Yoruba goddess of the same name. According to Osun state Government [12] the name “Osun’’ comes from a river that flows through the state. It is symbolic because it serves both spiritual and tourist purposes in the state. The river is worshipped annually by devotees. It is also a tourist spot as people from different parts of the country visit the Osun Groove in Osogbo. The river also provides water for irrigation for the agriculturally rich state. The state has a covering of tropical rain forest and Savannah zones. It is inhabited mainly by the Yoruba people. Osun’s economy is based mainly on agriculture. It has 256,000 farming Families and cultivated 149,478 Hectares of land.

According to the Osun State Department of fisheries as cited by Olasunkanmi, Omitoyin and Ipinmoroti [13] the state is divided into six fisheries zones which are: Iwo, Ife, Ilesa, Osogbo, Ikirun and Ede. Three zones (Iwo, Osogbo and Ede) were randomly selected. The list of registered fish farmers was obtained from fish farmers association. The list contained 381 fish farmers. Random selection of 42% of the registered fish farmers resulted to sample size of 160 respondents.

Structured interview schedule was used to collect data. The study contains both dependent and independent variables. The dependent variable was level of utilization of cyber extension technologies for fish farming information. This was measured on 3 points rating scale of high – 3, moderate -2 and low – 1. The independent variables which are the selected socio-economic variables measured accordingly. Data collected were analysed using frequency counts, percentages and mean. Also Pearson correlation was used to establish relationship between selected variables.

3. RESULTS AND DISCUSSION

3.1 Socio-economic Characteristics of the Respondents

The distribution of respondents by age revealed that the mean age of the respondents was 36 years. This implies that respondents were in their youthful age. Youth tends to be inquisitive and aligned with smartphone technologies usage in their information seeking behavour thereby constitute chunk of cyber information users. Age distribution of respondents shows that 55% were males while 45% were females. The result implies male fish farmers dominated the industry. Also, majority (80%) were married. Married people are usually seen as matured and inclined people. Therefore, it is expected to make them concentrate on their farming activities and also make family labor available to assist in fish farming activities. The distribution of respondents by religion revealed that 48.7% were Christians, while 51.3% were Muslims. This means religion is not a barrier to fish production.

The distribution of respondents by level of education revealed that the mean years spent in schooling was 15.5 years indicating that respondents had considerable level of literacy which could assist the respondents to source fish production information through cyber extension. The mean household size was 4persons. This means that the respondents had a moderate household size which is expected to serve as family labor supply to the respondents thereby reducing the amount that would have been spent in paying for the services of hired labor. The mean year of fish farming experience was 6.8

years. This implies that the respondents had substantial experience in fish farming.

The mean number of ponds owned by the respondents was 5ponds. This is an indication of moderate scale of operation, a signal of opportunity to increase scale of operation. The mean annual income of ₦425,125 naira were obtained from fish farming. An indication that its more than the benchmark minimum pay in Nigeria. The distribution of respondents by contact with extension agents revealed that

Table 1. Distribution of respondents according to their socio economic characteristics

n = 160

Socioeconomic variables	Frequency	Percentage	Mean
Age (years)			
<30	48	30	
30-39	54	33.8	36
40-49	20	12.5	
50-59	30	18.7	
60>	8	5	
Sex			
Male	88	55	
Female	72	45	
Marital status			
Single	4	2.5	
Married	128	80	
Separated	4	2.5	
Widowed	24	15	
Years spent schooling			
1-6	40	25	
7-12	36	22.5	
13>	80	50	15.5
No formal education	4	2.5	
Household size (persons)			
<5	110	68.8	4
5-6	42	26.2	
7>	8	5	
Fish farming experience (years)			
<5	60	37.5	
5-9	54	33.8	6.8
10>	46	28.7	
Number of Ponds			
<5	90	56.3	4.9
5-6	30	18.7	
7-8	24	15	
9>	16	10	
Annual income (Naira)			
<300,000	28	17.5	
300000-499000	82	51.3	425,125
500,000>	50	31.2	
Contact with extension agents			
Yes	74	46.2	
No	86	53.8	
Sources of labour			
Personal labor	16	10	
Family labor	18	11.2	
Hired labor	36	22.5	
Both family and hired	66	41.3	
No response	24	15	

Source: Field survey; 2021

46.2% of the respondents have contact with the extension agents, while 53.8% of the respondents did not have contact with the extension agents. This suggests that cyber extension is an appropriate option for providing fish farming information since most farmers claimed no contact with conventional extension contact. Moreover, the distribution of respondents by source of labour revealed that 10% of the respondents uses personal labour, 11.2% of the respondents' uses family labour only, 22.5% uses hired labour only, and 41.3% uses both family and hired labour. This indicates that a combination of family and hired labor was the main source of labour for fish farmers.

3.2 Awareness of Cyber Extension Fish Information Sourced through the Use of Cyber Extension

The distribution of respondents according to the awareness of cyber extension revealed that 85% of the respondents were aware of cyber extension while 15% of the respondents were not aware. This indicates that respondents take cognizance of cyber activities in agriculture especially extension information on fish farming.

3.3 Various Fish Farming Information Sourced through the Use of Cyber Extension

The major information sourced through Cyber extension by fish farmers were information on pond construction (65%), fish feed formulation (75%), pests and disease control (72.5%), poaching (52.5%), quality fingerlings (76.3%), marketing of fish (83.8%) and fish laying (85%). This means several stages of fish production were taking care of in the cyber extension packages of fish production.

3.4 Level of Utilization of Cyber Extension Technologies for Fish Farming Information

The distribution of respondents according to level of utilization of cyber extension technologies for fish farming information revealed smartphone attracted high utilization to obtain fish farming information. This finding could be linked to the fact that smartphone is readily available and affordable in Nigeria depending on ones purchasing power. Its simplicity and handy which make it easier to access internet at any time. Also laptop attracted high utilization. Several portable laptops abounds in the country. Some utilize laptop at office, home and various ICT centres. This means respondents explore laptop to seek fish production information. The better advantage of laptop is wider screen and adaptability to open many internet applications. However, Computer attracted lower utilization, this could be linked to its bulkiness and the need to depend on electricity to operate them. Also, Tablet/Ipad were on low utilization index. The price of this technology is on high and is not as handy as smartphone.

Table 2. Distribution of respondents according to awareness of cyber extension fish information sourced through the use of cyber extension

Awareness of cyber extension	Frequency	Percentage
Yes	136	85
No	24	15

Source: Field survey, 2021

Table 3. Distribution of respondents according to various fish farming information sourced through the use of cyber extension

*Various fish farming information sourced through the use of cyber extension	Frequency	Percentage
Pond construction	104	65
Fish feed formulation	120	75
Pest and disease control	116	72.5
Poaching	84	52.5
Quality fingerlings	122	76.3
Marketing	134	83.8
Fish landing	136	85

Source: Field survey, 2021
**Multiple response*

Table 4. Distribution of respondents according to level of utilization of cyber extension technologies

Cyber extension technologies	Mean	Remarks
Smartphone	2.1	High
Computer	0.9	Low
Laptop	1.2	High
Tablet/Ipad	0.7	Low

Source: Field survey; 2021
Mean score ≥ 1 suggests high utilization

3.5 Constraints Encountered by Fish Farmers in the Utilization of Cyber Extension

The distribution of respondents according to the constraints encountered in sourcing for fish farming information through the use of cyber extension. Erratic power supply, poor network and poor technical know-how constituted the bulk of constraints faced by fish farmers. This indicates that there were several constraints encountered towards the utilization of cyber technologies in obtaining fish information. This study supported the work of Ogunremi and Olatunji (2019) which identified poor technical know-how and power supply as a factor that affects adoption of fish technologies in Delta state, Nigeria.

3.6 Benefits Associated with Utilizing Cyber Extension Technologies for Obtaining fish Farming Information

Convenience to source information top the benefits derived from utilizing cyber extension technologies. Respondents can easily access various channels and social media platforms at any point in time with ease to seek information and interact with fellow farmers and experts in the field of fish production thereby sharing knowledge on ways to improve their production. Similarly, timely information exchange between the actors involved in fish farming is a great benefit for farmers. Fish production technologies is a very time conscious activity, hence the more timely they access those information the better for the farmers. Others benefits are reliable source of information and cost effectiveness. Reliability of information could be attributed to filtering of information through their association and other stakeholders involved in fish production. In addition if the number of audience obtaining cyber extension information on fish production technologies are put into consideration, the cost is relatively cheaper. This means respondents obtained tremendous tangible benefits from utilizing cyber extension technologies.

Table 5. Distribution of respondents according to constraints militating against the use of cyber extension technologies for fish farming information

Constraints encountered *	Frequency	Percentage
Erratic power supply	132	82.5
Poor network	130	81.3
High cost of data	118	73.8
Poor service from the service providers	104	65
Poor technical know-how	120	75
Poor financial capacity	96	60

Source: Field survey; 2021
** Multiple response*

Table 6. Distribution of respondents according to benefits associated with utilizing cyber extension technologies for obtaining fish farming information

Benefits*	Frequency	Percentage
Types of benefits associated		
Reliable source of information	120	75
Increase fish yield	132	82.5
Timely information exchange	108	67.5
Convenient source of information	136	85
Cost effectiveness	118	73.8

Source: Field survey; 2021
** Multiple response*

Table 7. Significant relationship between respondents' socioeconomic characteristics and utilization of cyber extension technologies

Socioeconomic characteristics	r(correlation coefficient)	P-value	Decision
Age	*0.566	0.002	S
Household size	**0.698	0.010	S
Number of years spent schooling	*0.532	0.001	S
Number of ponds	**0.268	0.023	S
Annual income	*0.425	0.001	S

Source: Field survey, 2021
** Correlation is significant at 1%*
*** Correlation is significant at 5%*
S = Significant

3.7 Significant Relationship between Respondents' Socioeconomic Characteristics and Utilization of Cyber Extension Technologies

Table 7 shows the Pearson correlation analysis of the relationship between respondents' socioeconomic characteristics and utilization of cyber extension technologies It was observed that there was positive and significant relationships between respondents' age (r= 0.566; p ≤ 0.05); household size (r=0.598; p ≤ 0.05); number of years spent schooling (r= 0.532; p ≤0.05); number of ponds owned (r= 0.268; p ≤ 0.05), annual income (r= 0.525; p ≤ 0.05) and utilization level of cyber extension technologies among fish farmers. This implies that as respondents increase in age, years of education qualification, the more they utilize cyber extension technologies. Also, increase in number of ponds require more expertise which could influence utilization of cyber extension technologies. Income is greatly linked to purchase of cyber extension technologies such as smartphone and laptop; network data hence the more the income, the better the prospects of channeling it to utilization of cyber extension information on fish production.

4. CONCLUSION AND RECOMMENDATIONS

From the findings, the study concludes that:

- High utilization of cyber extension technologies of smartphone and laptop are highly beneficial to obtaining fish production information.
- Top benefits derived from using cyber extension technologies includes convenience source of information, timely information exchange and cost effectiveness of obtaining fish production information.

The study therefore recommended that:

- Fish farming information packages on cyber extension should address the identified challenges of poor technical know-how, this will assist farmer to improve their knowledge and use better strategies for fish production.
- Smartphone could be given to fish farmers as incentive by relevant stakeholders in agriculture since it's the highest utilized cyber extension technology to source fish production information.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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