

## **WILLINGNESS-TO-PAY FOR AGRICULTURAL EXTENSION SERVICES BY FISH FARMERS IN NIGERIA: A CASE STUDY OF KWARA STATE, NIGERIA**

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### **ABSTRACT**

The need to improve fish production in developing countries through adequate access to agricultural extension services necessitated the focus of this study. A structured questionnaire was used to elicit data from 60 registered fish farmers randomly selected across the study area. Descriptive statistics and logistic regression model were used to analyse the data. The major areas of information needs of the farmers were fish breeding, access to formal credit, feed formulation and management. The study also revealed that stock size, nature of production, level of education and age of the farmers were the significant factors affecting willingness-to-pay for extension services by the fish farmers. The study recommends improved extension services, large scale fish farming and encouragement of fish production by young, educated individual.

**Keywords:** fish farming, extension services, willingness-to-pay, factors, information needs, developing countries.

### **INTRODUCTION**

The contribution of the fishery sector to global economy and food security cannot be underestimated. Fish production serves as means of livelihoods to millions of people worldwide (Greenfacts, 2004). Fish farming helps empower the poor and directly promote their standard of living (Obikezie, 1999). It has been reported that fish contributed 6 to 8 percent of agricultural sector's total contribution to GDP (CBN, 2005). Fish contributes 40% of total dietary protein consumption in Nigeria (FDF, 1997) and more than 60% of the total intake in adults especially in rural area (Adekoya and Miller, 2004). Amienheme (2005) reported that fish has a nutrient profile superior to terrestrial meat being an excellent source of high quality animal protein, sulphur and essential amino acid. The flesh of fish is also readily digestible and immediately utilizable by the human body, which makes it suitable and complementary for African countries, including Nigeria, with high carbohydrate diet (FAO, 2005). Fish is relatively cheaper than meat and there is hardly any religious taboo affecting its consumption unlike pork and beef.

Globally, the demand for fish has continued to be on the increase, especially in the developing countries which import about 33 million tonnes of fish worth over US\$61 billion yearly. Nigeria is not left out in the struggle. According to CBN (2010), the demand for fish in the country is 1.5 million metric tonnes per annum while the domestic production is

769,680mT, indicating that only 47.3% of the demand is secured from domestic sources, leaving a wide gap of 52.7% of the demand unsecured. As noted by Esobhawan, Erie, Osasogie, Osifo and Ogundele (2011), about 80% of the Nigeria's demand for fish during the period of 1971 to 1980 came from domestic sources leaving just 20% to fish importation. Also, Rahji *et al.* (2001) reported that in 1986, the domestic sources accounted for 82% of the nation's demand for fish, leaving only 18% to fish importation. However, the situation has deteriorated abysmally, making fish importation to account for about 60% of the demand during the 2001-2005 (Esobhawan, 2007). Nigeria is now believed to be one of the largest fish importers in the world with official records indicating an average amount of ₦30 billion spent annually on fish importation (Bada and Rahji, 2010).

The inability of the farmers in developing countries, including Nigeria, to produce at a rate that can meet the need of the populace has been linked to lack of access to crucial information on improved agricultural practices, among other factors (ICS-Nigeria, 2005). This is exacerbated by the dearth of agricultural extension workers through whom farmers can be reached. This results from the limited resources available to the public extension agencies with which farmers are reached free of charge in developing countries (Budak, Budak and Kaçira, 2010). Therefore, in a bid to promote farmers' access to extension services, various forms of agricultural extension finance payments have been instituted in some parts of the world, like in the United Kingdom, Netherlands, Sweden, Germany, Chile and Portugal (Budak *et al.* 2010; Rivera and Cary, 1997). This trend would reduce the economic burden on government and increase the efficiency and effectiveness of extension (Shekara, 2004). The trend would also enhance sustainability in fish production.

Sustainability in the context of fish farmers' willingness-to-pay for extension services is premised within the meaning of sustainability as posited by the World Commission on Environment and Development (1987): "meeting the needs of the present without compromising the ability of the future generation to meet their own needs." A positive attitude of fish farmers towards financing extension services can enhance both ecological and socio-economic concepts of sustainability: It can make fish production levels relatively adequate for the present and future generations without reducing the ecosystem potentials. Besides, it can increase or maintain fish output to meet the social and economic needs of the actual and future generations.

Hence, the general objective of this study is to examine willing-to-pay for extension services by fish farmers in Nigeria, using Kwara State as a case study. The specific objectives are to describe the socio-economic characteristics of the farmers, identify the sources of agricultural information available to the farmers, determine the frequency of acquiring information from the sources, ascertain the extension needs of the farmers and examine the determinants of willing-to-pay for extension services by the farmers.

## **METHODOLOGY**

The study was carried out in Kwara State, Nigeria. Kwara State is one of the 36 states of Nigeria and located in the North Central zone of Nigeria (See Fig. 1) with Ilorin as its capital. The state lies between latitude 7°15' and 6°18' N of the equator. It has a population of about 2.37 million people (NPC, 2006). The state shares boundaries with Oyo, Osun, Ondo, Kogi, Ekiti, and Niger states. It shares an international boundary with the Republic of Benin. At present, the state comprises sixteen Local Government Areas (LGAs). The major economic activity of the people is agriculture.

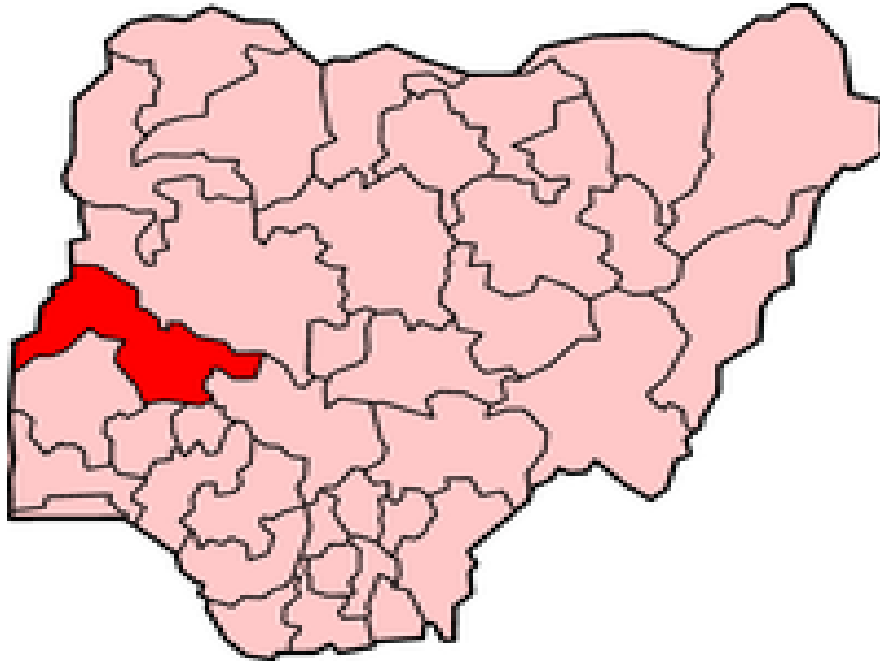


Fig. 1: Map of Nigeria indicating Kwara State

A two-stage random sampling technique was adopted for the study. The first stage involved random selection of five Local Government Areas (LGAs). The second stage involved random selection of 12 registered fish farmers in each of the selected LGAs, giving a total of 60 farmers. Data collected include socio-economic characteristics of the farmers, production data, frequency and effectiveness of agricultural information sources available to the farmers and extension needs of the farmers.

Descriptive statistics such as frequency counts, percentage, mean and standard deviation (SD) were used. Frequency of use of information source(s) was measured on a 4-point rating scale following Ovharhe and Okoedo-Okojie (2011) as frequent (every 2 weeks) coded 4, sometimes (3 weeks-2 months) coded 3, rarely (4months-6months) coded 2, and not at all coded 1. A mean score of 2.50 and above was taken that a particular information source was frequently/regularly used. Effectiveness was rated according to the number of technologies adopted through a particular information source. This was measured, following Ovharhe and Okoedo-Okojie (2011), in a 4-point rating scale of very effective (adopt  $\geq 5$  technologies) coded 4, just effective (adopted between 3 and 4 technologies) coded 3, less effective (adopt between 1 and 2 technologies) coded 2, and non-effective (adopt no technology) coded 1. A mean score of 2.50 and above was taken that a particular information source was effective. Rate of demand for extension services was also rated on 4-point likert scale of very important coded 4, important coded 3, undecided coded 2, and not important coded 1. A mean score of 2.0 and above was taken that a particular extension service is much needed by the farmer.

The logistic regression model was used to examine the determinants of the fish farmers' willingness to pay for extension services. Following Menard (1995) and Agresti (1996) the study logistic model is specified as

$$P_i = E \left( Y_i = \frac{1}{X_i} \right) = \frac{e^{(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_7 X_7)}}{1 + e^{(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_7 X_7)}} \dots \dots (1)$$

Where  $P_i$  is a probability that dependent variable  $Y_i = 1$  if the farmer is willing to pay for extension services and 0 if otherwise,  $\beta_0$  is the intercept which is constant,  $\beta_i$  is the coefficient of the factors that determine farmers' likelihood to pay for extension services and  $X_i$  is a set of independent factors/variables. The factors hypothesized were  $X_1$  = farming experience of farmer (years),  $X_2$  = Age of farmer (years),  $X_3$  = level of education acquired by farmer,  $X_4$  = Non-farm income in naira (₦),  $X_5$  = Nature of fish production (dummy, as full-time = 1, part-time = 0),  $X_6$  = farmer household expenditure in naira (₦) and  $X_7$  = stock size (number of fish stocked by farmer). The Chi-square was used to measure the goodness of fit of the model and the significance of the model used.

## RESULTS AND DISCUSSION

### Socio-economic Characteristics of the Respondents

The socio-economic characteristics of the respondents are presented in Table 1. The Table shows that the fish farmers were predominantly male (80%). This can be attributed to the tedious nature of fish farming particularly in the aspect of culture, as noted by Okonji and Bekederemo (2011). Majority (78.3%) of the respondents were married. This implies fish farming is practiced mostly by married people to make ends meet and cater for their family as noted by Meyer and Boon (2003) and Edeghon and Oria-Arebun (2011).

The mean age of the respondents was 35.2 years, with most (91.7%) of the respondents within the age range of 18 – 50 years. This indicates that the farmers were relatively young and active. All things being equal, these farmers should be able to accept innovations more easily and vigorously than their aged counterparts. As noted by Nwaru, Onuoha, Iheke and Onyechonam (2010), the mental capacity of an individual to cope with innovations decreases with advancing age.

Though majority (53.3%) of the respondents had a farming of 1- 5 years, a mean of 5.6 years was obtained in the study. Table 1 shows that 60.0% of the respondents were into full-time fish farming, implying that majority of the fish farmers engage in it as their main occupation basis while the remaining 40% combined fish farming with cropping, trading, etc. This could be related to the intense care required in management of fish farms. This however disagrees with the findings by Okonji and Bekederemo (2011) who reported fish farming was carried out majorly by part-time farmers in Edo State of Nigeria.

Most (86.7%) of the respondents stocked *Clarias gariepinus*. This might be due to its hardy nature and high consumers preference as reported by Okonji and Afegbua (2004) and Omityin (2007). About 69% of the respondents stocked less than 5000 fingerlings. Further analysis of the results showed that the average stocking rate by the respondents was 3793 fish seeds. This indicates that most of the fish farmers were small-scale producers. This study agrees with the findings of Oladebo (2004) who observed that Agriculture in Nigeria is dominated by small-scale producers. Majority (71.6%) of the farmers used earthen ponds for their production. This, according to the farmers, was due to its reduced costs compared to other forms of rearing facilities.

The results in Table 1 also show that 95% of the respondents had one form of formal education or the other. The results also show that 70% of the respondents had higher education. These imply that the fish farmers are highly educated. This could result from the need for technical know-how on efficient fish management practices as observed by Okonji and Bekerederemo (2011). Table 1 also shows that 83.3% of the fish farmers utilize own funds as source of finance while just 5.0% used loans from formal sources like banks and other financial institutions.

Table 1: Socio-economic Characteristics of the Fish Farmers (N = 60)

Characteristics	Category	Frequency	Percentage
Sex	Male	48	80.0
	Female	12	20.0
Marital status	Single	11	18.3
	Married	47	78.3
	Widowed	2	3.3
Age (years)	≤ 20	2	3.3
	21 – 30	7	11.7
	31 – 40	17	28.3
	41 – 50	29	48.3
	51 – 60	5	8.3
Farming experience (years)	1 – 5	32	53.3
	6 – 10	15	25.0
	11 – 15	7	11.7
	16 – 20	4	6.7
	> 20	2	3.3
Nature of production	Full-time	36	60.0
	Part-time	24	40.0
Species of fish stocked	Clarias	52	86.7
	Tilapia	2	3.3
	Heteroclaris	4	6.7
	Clarias/Tilapia	2	3.3
Stock size	<5000	41	68.3
	5001 – 10000	13	21.6
	10001 – 15000	3	5.0
	15001 – 20000	2	3.3
	20001 – 25000	1	1.7
Rearing facility	Earthen pond	43	71.6
	Concrete tank	13	21.6
	Plastic	4	6.7
Highest level of education	No formal education	3	5.0
	Primary education	7	11.7
	Secondary education	8	13.3
	NCE/OND	32	53.3
	HND/B.Sc. and above	10	16.7
Main source of funding	Own funds	50	83.3
	Formal credit	3	5.0
	Informal credit	7	11.7

Source:Field survey, 2012

### Sources of Information on Fish Production and Management

Table 2 shows the various sources of information available to the respondents and their effectiveness. The Table shows that the most frequently sources of information used for fish farming and management by the farmers were fellow

farmers (M = 3.48), friends/neighbours (M = 3.22), social group (M = 3.03) and television/radio (M = 2.84). This indicates that the farmers' quest for information on fish farming and management is absolutely based on their personal efforts, with less effort from public extension services (M = 1.83). This point of view is also in consonance with perceived effectiveness of the various sources by the respondents as the respondents claimed that fellow farmers (M = 3.21), friends/neighbours (M = 3.05), social group (M = 2.97), bulletins/posters/handbills (M = 2.65) and agricultural journals (M = 2.56) were the effective sources of information available to them. These results agree with the findings of William and Williams (1991) and Ovharhe and Okoedo-Okojie (2011) who reported that livestock extension service in Nigeria is generally poorly organized and in some cases non-existent.

**Table 2: Frequency of Sourcing Agricultural Information**

Source of information	Frequency		Effectiveness	
	Mean	SD	Mean	SD
Fellow farmers	3.48*	0.7	3.21**	0.8
Friends/neighbours	3.22*	0.6	3.05**	0.9
Television/radio	2.84*	0.8	1.97	0.8
Social group	3.03*	0.9	2.97**	0.7
Extension agents	1.83	0.8	2.12	0.6
Veterinary services	2.41	0.5	2.23	0.8
Internet	1.23	0.8	1.45	0.8
Agricultural journals	2.30	0.6	2.56**	0.5
Bulletins/posters/Handbills	2.42	0.7	2.65**	0.8

\*Frequency (mean  $\geq$  2.50)

\*\*Effective (mean  $\geq$  2.50)

Source: Field Survey, 2012

### **Extension Services Needed by the Respondents**

Table 3 shows the results of the extension needs of the respondents. The Table shows that the fish farmers desire training most on fish breeding (Mean = 3.53), access to formal credit facilities (mean = 3.02), feed formulation (mean = 2.55) and management (mean = 2.10). Other area in which the respondents need extension services were pond construction, marketing outlets and stocking with mean score of 1.76, 1.34 and 1.22 respectively.

Table 3: Distribution of Respondents by Extension Services Needed

Extension Services	Mean	Rank
Pond construction	1.76	5th
Fish breeding	3.53*	1st
Management	2.10*	4th
Assess to formal credit	3.02*	2nd
Stocking	1.22	7th
Feed formulation	2.55*	3rd
Marketing outlets	1.34	6th

\*Important (mean  $\geq$  2.00)

Source: Field Survey, 2012

#### **Determinants of Willingness-to-pay for Extension Services by the Respondents**

Table 4 presents the factors hypothesized to affect farmers willingness-to-pay for extension services. The Chi-square of 68.82 obtained in the study implies that the parameters included in the logistic model are significantly different from zero at the 1 per cent level. The Pseudo R<sup>2</sup> of 0.6821 implies that 68.21% of the variation in farmers' willingness-to-pay are explained by the hypothesized independent variables. The results age of the farmer, level of education, nature of production and number of fish stocked are the significant factors affecting fish farmers' willingness-to-pay for extension services. Age of the farmer is negatively related to willingness-to-pay and significant at 5%. This implies that the older a fish farmer is, the less willing he is to pay for extension services. This is logical, as young people are more innovative and willing to adapt to innovations (Muhammad-Lawal, Omotesho and Falola, 2009; Nwaru *et al.*, 2010). The level of education of the farmer and the number of fish stocked are positively and significantly related to farmer's willingness-to-pay at 5% and 1% respectively. This indicates that a rise in the level of education of a farmer and/or number of fish stocked will increase farmer's willingness-to-pay for extension services. Also, the results also suggest that farmers who practice fish farming on full-time basis are more willing to pay for extension services than their part-time counterparts.

Table 4: Factors Affecting Respondents' Willingness-to-Pay

Variables	Coefficient	Standard Error	z-value
Farming experience	-0.6019	1.8679	-0.32
Age	-0.2061**	0.1036	-1.99
Level of education	2.3341**	1.0536	2.22
Non-farm income	0.0008	0.0001	1.35
Nature of production	0.0312***	0.0160	1.94
Farmer's household expenditure	-0.0247	0.0732	-0.34
Stock size	2.8891*	1.0944	2.64
Constant	-19.0978	9.9042	-1.93
No of observation = 60			
LR chi2(7) = 68.82			
Log likelihood = -8.4631265			
Pseudo R <sup>2</sup> = 0.6821			

\*, \*\* and \*\*\* indicate statistical significance at 1%, 5% and 10% respectively

Source: Field Survey, 2012

## CONCLUSION AND RECOMMENDATIONS

This study examined willingness-to-pay for extension services by fish farmers in Nigeria using Kwara State as a case study. It stemmed from the need to meet the demand for fish in developing countries, including Nigeria through sustainable agricultural extension services. It can be inferred from the study that fish farmers in the study area were mostly male, married and of active age range. The study also shows that the main sources of agricultural information available to the farmers were fellow farmers, friends/neighbour, social groups and television/radio and were more effective than extension services in the study area. The major area of information needs of the farmers were fish breeding, access to formal credit, feed formulation and management. The study also revealed that stock size, nature of production, level of education and age of the farmers are the significant factors affecting willingness-to-pay for extension services by the fish farmers.

Based on the findings of this study, therefore, it is recommended that efforts should be made by government and agricultural development agencies to overhaul extension services on fish production. Area of concentration by these agencies should include fish breeding, access to credit facilities, feed formulation and sound fish management. Also, more young and well educated individual should be encouraged to engage in fish farming. This could be through provision of incentives such as improved fingerlings, credit facilities, etc. Moreover, large scale production of fish should be encouraged among the farmers. In this regard, farmers could be trained on fish breeding in order to enhance their stock size. Besides, full-time fish farming should be encouraged.



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