Socio-Economic Determinants to Catfish Production in Anambra State, Nigeria

Author's Details: [(1)]Ezeano, CI [(2)]Gbughemobi, B O
Department of Agricultural Economics and Extension. Nnamdi Azikiwe University, Awka, Anambra State, Nigeria

Abstract
Effect of socio-economic variables on the output levels of catfish farmers in Anambra State, Nigeria was studied using information from sixty respondents. The objective of the study were to,(i)describe the socioeconomic characteristics of the respondents, (ii) determine the profitability of catfish production (iii) analyze the farmers' socioeconomic factors that influence catfish production and (iv)identify the constraints to catfish production in the study area. A well structured questionnaire was used to collect appropriate information as relates to primary data. Percentage response was used to address objectives i and iv. Gross margin and profit analysis were used to address the objectives ii, while objective iii was addressed using multiple regression. The result of the socioeconomic characteristics shows that majority of the catfish farmers were male, youthful and had formal education. In addition, catfish was profitable in the study area with gross margin of ₦323,600 and profit of ₦155,100. Furthermore, the socioeconomic determinants to catfish farmers' output were educational level, membership of organizations and farming experience. Finally, the major constraints to catfish production were poor access to credit, high cost of feed and poor fish seed. Farmers' access to improved fingerlings and education and credit were recommended

Keyword; *Socio-Economic , Determinants, Catfish, Production, Nigeria*

Introduction

The economic importance of fishery sector include source of food, provision of employment, source of foreign exchange/income, tool to rural development and source of raw materials to manufacturers (FAO,2011). Fish is very important in the diet of many Nigerians, high in nutritional value with complete array of amino acids, vitamins and minerals (Eyo, 2007). In addition, fish products are relatively cheaper compare to beef, pork and other animal protein sources in the country (Ochiaka and Ume, 2015).In Nigeria, Fish production is practiced in two environments namely fresh and salts waters. The fresh water fish production is classified into three major subsectors; artisanal captured fishery, industrial captured and aquaculture. The artisanal captured fishery is the most important subsector as it represents between 85-90% of domestic production and providing means of economic support and livelihood for millions of rural dwellers, particularly in some part of South East, Niger Delta, Northeast and Middle belt regions of the country (FGN, 2012). It is evident that, the limited supply of fish from marine and fresh water capture fisheries cannot be able to meet the growing world demand for aquatic products (Oladejo,(2010). FAO (2007) advocated the development and strengthening of aquaculture as important supplement to and substitute for dwindling yield from the wild.

Aquaculture refers to the cultivation of aquatic organisms under controlled or semi-controlled conditions for economic and social benefits. Aquaculture has been the world's fastest growing food production system over the past decade (Akinrotimi, et al2007). The average growth rate for aquaculture has been 8.9% per year since 1970, compared to only 1.2% for capture fisheries and 2.8% for terrestrially farmed meat production over the same period (Eyo, 2007). Aquaculture according to Odukwe (2007) accounts for close to 50% of the present global fish consumption. . In, according to figures revealed by the National Bureau of Statistics, the fisheries sector contributed 1.31% of total GDP in 2012 and this rose to 1.38% at the end of the third quarter of 2013. These figures represent 3.3% and 3.5% of agricultural GDP respectively (CBN,2004).

Catfish farming is a subset of aquaculture which involves the rearing of catfish under controlled conditions for economic and social benefits (Emokaro, et al.2010).Catfish are hardy, tolerate dense stocking, and thrive in a wide range of environmental conditions (Anyanwu, et al 2008). They are easily spawned under proper conditions, yet will not spawn when placed in the grow-out ponds, which gives the farmer control over

the production process (Amao,2006). The favoured catfish for culture as asserted by Adewumi and Olaleye (2011) and FAO, (2011), include *Clarias gariepinus, Heterobranchus bidorsalis, Clarias heterobranchus* hybrid (heteroclarias), with *C. gariepinus* and *H. bidorsalis* being the most cultured fish in Nigeria. However, in Nigeria, aquaculture industry has been plagued with problems and amongst is of low productivity, high mortality, water scarcity, high cost of feed and poor management practices. Nevertheless, increasing demand for fish products has resulted in the growth of fish farms worldwide to meet a substantial part of the world's food requirement, of which China contributes a major portion (Olasunkanmi, 2012).

This growth of fish could be associated to among others the socioeconomic characteristics of the farmers, Hence, there is need to be identified and analyzed these factors in order to inform policy formulation and implementation in fishery industry. Hence, the objective of this study is to identify and analyze the farmers' socioeconomic factors that influence catfish production in the state. Information gathered will be useful to policymakers and catfish stakeholders for understanding the factors affecting cat fish production for proper planning, development and implementation of catfish production projects and interventions towards achieving food security. The other specific objectives of the study were to determine the profitability of catfish production and to identify the constraints to catfish production in the study area.

Materials and Methods

Anambra state is the study area and located in longitude 6036' - 7021'. No of, Greenwich meridian and latitude 5038' _6047'E of the equator. Anambra state is bounded in the south by Imo state, in the east by Enugu state, in the North by Kogi state, and in the West by Delta state Anambra state has 21 local government areas with Awka as capital. It has population figure of 4.184 million people (NPC 2006) with land area of 4415.54km2. Anambra state is divided into four zones; Anambra, Onitsha, Awka and Aguata. Anambra state is intercepted by numerous streams and tributaries flowing into River Niger. The state has mean temperature of 28-38ocand rainfall of1500-2500mm.Multistage random sampling technique was used for the study. Three zones were selected from the four agricultural zones. The selected zones were Onitsha, Awka and Anambra. Four blocks were selected from each of the zones. Five circles were selected from each of the sampled block, making sixty circles. One fish farmer was selected from each circle and interviewed, making a total of sixty farmers. Well structured questionnaire was administered to each of the sixty farmers to collect information on input and output quantities used and their unit prices, farmers' socioeconomic characteristics and other essential information as related to the study. Secondary data were obtained from journals, internets, seminar and other periodicals. Percentage response was used to determine the catfish farmers' socioeconomic characteristics and their constraints to catfish production. Ordinary least square regression method was used to analyze the effect of farmers' socioeconomic characteristics on their output. The model is implicitly stated as:

$$Y = f(X_1\ X_2\ X_3\ X_4\ X_5\ X_6 + X_7\ X_{8+}\ e) \text{ ----------(1)}$$

Where Y = quantity of catfish produced (kg), X_1 = gender (dummy); X_2 = age (yrs), X_3 = educational level (yrs), X_4 = pond size (m^2), X_5 = membership of cooperative (dummy) X_6 = extension contact (Number), x_7= farming experience (years), x_8 = Access to Credit. e = error term. Four functional forms (linear, double log, semi double log and exponential functions) of production function were tried and explicitly represented as

Linear function:

$$Y = b_0 + b_1\ x_1\ b_2\ x_2 + b_3\ x_3 + b_4\ x_4 + b_5\ x_5 + ei \quad \text{..... (1)}$$

Double log function (Cobb Douglas):

$$\ln(y) = \ln b_0 + b_1 \ln x_1 + b_2 \ln x_2 + b_3 \ln x_3 + b_4 \ln x_4 + b_5 \ln x_5 + ei \quad \text{..... (2)}$$

Semi double log function:

$Y = \ln b_0 + b_1 \ln x_1 + b_2 \ln x_2 + b_3 \ln x_3 + b_4 \ln x_4 + b_5 \ln x_5 + ei$ …… (3)

Exponential function:

$\ln Y = b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + ei$ …… (4)

The choice of the best functional form was based on the magnitude of the R^2 value, the high number of significance, size and signs of the regression coefficients as they conform to *a priori expectation*.

The profitability ratio and gross margin analysis models were specified as follows: The profitability ratio and gross margin analysis models were specified as follows:

Benefit Cost Ratio = TR/TC---------- (6)

Gross Ration = DFC/TR---------- (7)

Expenses Structure Ration (ESR) = FC/VC---------- (8)

Gross Margin = TR – TVC---------- (9)

$$\text{i.e. G.M} = \sum_{1-1}^{n} P_1 Q_1 - \sum_{j-i}^{m} r_i x_i \quad \text{..... (10)}$$

The net farm income can be calculated by gross margin less fixed input. The net farm income can be expressed as thus:

$$\text{NFI} = \sum_{1-1}^{n} P_1 Q_1 - \left[\left(\sum_{j-i}^{m} r_i x_i \right) + k \right] \quad \text{..... (11)}$$

Where:

GM = Gross margin (₦)

NFI = Net farm income (₦)

P1 = Market (unit) price of output (₦)

Q = Quantity of output (kg)

ri = Unit price of the variable input (kg)

xi = quantity of the variable input (kg)

K = Annual fixed cost (depreciation) (₦)

i = 1 2 3 …….. n

j = 1 2 3 …….. m

Profit (π) = GM – TFC. ---------- (12)

where: GM = gross margin, TR = total revenue, TVC = total variable cost, TFC = total fixed cost, (Ezike, and Adedeji, 2010).

Results and Discussion

Table 1 show that 83.3% of the fish farmers were males, while 16.7%, females. The implication is males dominated the enterprise production because of the roles they play as heads of households and as well the capital intensiveness of the enterprise (Ochiaka and Ume, 2015). The table also reveals that most (60%) of farmers were youthful (below 40 years of age) , hence very adoptive, innovative and motivational individual for enhanced agricultural development (Ume, et al 2015). Most of the farmers (91.7%) were educated and only 8.3% had no formal education. High educational status according to Asiabaka,(2003) helps to facilitate adoption of technology as it makes one to be more objective in evaluating innovations, which would positively influence his/her production Furthermore, 50% of the catfish farmers operated on a pond size of $25m^2$, indicating the subsistence nature of their operation to the expense of higher outputs. Nevertheless, the poor economic enhancement of the respondents may be a contributory factor. Most of the respondents (75%) did not belong to cooperative organization. This implies that training and credit access at low interest rate that are often benefited by cooperative members could elude the vast catfish farmers in the state, hence, low production and productivity could ensue (Ezike, and Adedeji, 2010). Also, 66.7% of the catfish farmers had access to credit through formal and informal sectors, while only 33.3% had no access. This assertion is in line with Oladiejo, (2010), who reported that credit has the potential to enhance efficient resource allocation, permits application of technology, reduces post harvest wastes and stabilizes farm input prices.

More so, 66.7% of the catfish farmers interviewed had no access to extension services. Extension services helps in information dissemination and as well as giving technical assistance to the farmers for productivity to be attained (Asiabakah, 2003). Most (30%) of the respondents had farming experience of 11-21 years. This implies that the respondents have been in catfish production for a long period of time and could be an added advantage that will help them to improve on their efficiency and effectiveness in the business (Oladiejo, 2010).

Table 2 shows that the average total variable cost for rearing 1,000 fish of about 950kg for 8-12 months was ₦247,400, while the total fixed cost was ₦119,500. The total cost amounted to ₦386,900. The average total revenue earned from the sales at N600 per kg of 950kg of *Heterobranchus bidoscarus* (catfish) was ₦570,000. The gross margin as shown in table 3 was ₦322,600 and profit of ₦153,100. Profitability estimate result shows that benefit cost ratio (BCR) was 1:40 and as rule of thumb, project with BCR greater than one (>1), indicates profit. Expense structure ratio (RSR) was 0.48, which implied that 48% of the total cost of production is made up of fixed cost component. The lower in the fixed cost will increase the variable input used which will in turn increase total revenue. Gross Ratio (GR) was 0.2123, which implies that from every ₦1.00 returns to the enterprises, ₦21.23k is spent.

Ordinary least square estimate was used to determine the effect of socioeconomic characteristics on the farmers' output and shown in Table 3. Double log was chosen as lead equation because it had highest R^2 of 0.886 and high number of significant variables. The R^2, 0.686 indicates that 68.6% variation in the output of catfish farmers in the study area were explained by the independent variables included in the model, while, the remaining 31.4% were due to error term. In line to *apriori* knowledge, the coefficient of age of the farmer was negatively related to their output and significant at 5% alpha level. The negative relat ionship between age of the farmer and farmers.'output as shown in Table 3 did agree with the finding of Nwaru, (2004), who stated that the risk bearing ability and innovativeness of a farmer, his mental capacity to cope with daily challenges and demands of farm production activities and his ability to do manual jobs decreases with advancing age. This could invariably reduces his/her output.

The coefficient of educational attainment was positive and significant at 1% probability level. Education helps in facilitating farmers' use of written information sources and increasing their knowledgeand comprehension of

new farm practices(Ochiaka and Ume, 2015). The poor notion educated people have for farming as job for the illiterates could be the reason for negative relationship between education and farmers' level of output as variously reported in many literatures (Ezeano, et al (2017).

In addition, the coefficient of farming experience was positive and significant at 5% alpha level This finding is synonymous with Nwosu, et al (2003), who reported that years of farming experience increases farmers' managerial ability and efficient resource allocation, which consequently high output ensue. In addition, the coefficient of membership of organization was positive in line with aprori expectation and significant at 10% probability level. The number of socioeconomic associations like cooperatives, age grade and trade union to which farmers belonged are expected to increase his interaction with his fellow farmers and other entrepreneurs in his environment. Such interactions would help them to receive and synthesis new information on economic activities in his locality and even beyond. Furthermore, Ezeano, et al (2017) posited that farmers who belong to cooperatives are likely to have access to good quality inputs, information and organized marketing of production for enhanced output. In contrary, Ezike and Adendiji, (2010)reported that farmers ' output can be negatively affected, especially where the farmer spend much of farm business time attaining to cooperative activities.

As against expectation, the coefficient of credit had indirect relation with dependent variableat 95% confidence interval. The sign identity of the variable could be related to poor access to credit by the rural farmers as result of high interest rate and inability to provide collateral as demanded by the lending agency in the country (Ezeano, etal 2016). It is believed that access to credit promotes the adoption of risky technologies through relaxation of the liquidity constraints as well as through boosting of household risk bearing ability. This is because with an option of borrowing, a household can do away with the risk reducing but inefficient income diversification strategies and concentrate on more risky but efficient investment (Onyenweaku, *et al*. 2010). Finally, the coefficient of extension contact was negative and significant at 10% alpha level. The sign identity contact could be related to a situation where extension agent brings to farmers inputs for example at odd time for use by the farmers (Kareem and Williams, 2008).

Major constraint to catfish production as shown in table 4 was poor access to credit (83.3%). Farmers'poor access to credit could be linked to high interest rate, lack of information of about availability of credit and lack of collateral as demanded by the lending agencies (Ume, et al.2015). In addition, poor fish feed (80%) The farmers because of high cost of feed, they resorted in using poultry mash in feeding the fish which is very unproductive to the growth of the fish (FAO, 2013). . As well 63.3 % of the farmers reported about the problem of poor fish feed breeds. The stocking of such fish seeds are very uneconomical, waste space and finance (Ezike and Adedeji. 2010), The other problems were high cost o pond construction (3.3) and cannibalism (43.3%).

Conclusion and Recommendation

The major conclusions derived were:

Catfish farmers in the study area were youthful, educated and had reasonable years of farming experienced. More so, catfish production is a profitable venture with positive Net farm income in the study. In addition, education, cooperative membership and farming experience were the major determinants to catfish farmers' output. Finally, the major constraints to catfish production in the study were poor access to credit, high cost of feed and poor fish seed.

Based on the finding the following recommendations were proffered;

(i) However, strictly speaking, catfish farmers are sparsely distributed in the villages. This means that high frequency of contact can be achieved by either reducing the extension-farmer's ratio or providing the extension agents with mobility and other incentives.

(ii) Farmers are advised to form cooperatives in order to have access to credit and inputs at subsidized prices.

(iii)There is need to expose farmers to various forms of educational programmes such as adult education, workshops and seminars. This will help to enhance the farmers' skills, adoptability and prudence in resource use

(iv) There is need to expose the farmers to the skill of feed formulations to reduce cost of feed , as industrial feeds are very expensive to procure.

(v)There is need to encourage old and experienced farmers to remain in production by making available to them improved inputs and credit at affordable cost

Table 1: Socioeconomics Characteristics of Catfish Farmers

Variables	Frequency	(%)
Gender		
Male	51	83.3
Female	9	16.7
Age (yrs)		
Less than 21	-	
21-30	8	3.3
31-40	34	56.7
41-51	10	16.7
51 and above	8	13.3
Level of Education		
No formal Education	5	8.3
Primary Education	25	41.7
Secondary Education	20	33.3
Tertiary Education	10	16.7
Pond size		
$5m^2$	30	50
5m x 7m	15	25
10 x 10m	8	13.3
10 x 15m	7	11.7
Membership of Cooperative		
Non-member	15	25
Member	45	75
Extension Contact		
Yes	20	33.3
No	40	66.7
Credit		
Access	40	66.7
No access	20	33.3
Farming experience (years)		
Less than 10	20	33.3
11-21	30	50%
Above 22	10	16.7

Source: Field Survey, 2017

Table 2: Gross margin and profit analysis of farmers

TVC (₦) (Total variable cost)	TFC (₦) (Total fixed cost)	TC (₦) (Total cost)	TR (₦) (Total revenue)	GM (Gross margin)	Profit	Benefit cost ratio
267,400	119,500	386,900	540,000	247,400	153,100	2.01

Source: Field Survey, 2017.

Table 3: Multiple Regression Results

Variable	Linear	+ Double Log	Expon.	Semi Log
Constant	0.014	1.001	4.047	0.791
	(4.016)***	(7.021)***	(6.913)***	(3.071)***
Age	1.007	0.777	1.766	0.001
	(0.2007)	(-2.009)**	(0.988)	(0.939)
Educational	0.327	1.404	1.003	3.082
Level	(2.75)**	(4.707)***	(0.437)	(2.44)**
Farming	1.051	1.710	2.001	0.725
experience	(0.331)	(2.005)**	(0.217)	(0.231)
Member of	1.244	2.041	4.001	0.289
Cooperative	(2.301)**	(1.491)*	(0.473)	(0.2001)
Extension	0.792	0.299	0.217	1.275
Contact	(0.549)	(-2.331)*	(2.881)**	(0.550)
Credit	1.087	0.9004	0.417	0.551
	(2.007)**	(-2.090)**	2.009	0.754
R^2	0.376	0.686	(0.554)*	(0.007)
F ratio	0.524	0.621	0.337	0.451

Source: Field Survey, 2016

Table 4: Constraints to Catfish Production

Item	Frequency	%
Poor access to credit	50	83.3
High cost of feeds	48	80
Poor fish seed	38	63.3
Cannibalism	26	43.3
High cost of pond construction	2	3.3
Total	**60**	**100**

Source: Field Survey, 2017

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