ECONOMIC VIABILITY OF CATFISH FARMING IN MOKWA, MOKWA LOCAL GOVERNMENT AREA, NIGER STATE, NIGERIA

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ABSTRACT

Fish farming is becoming one of the areas of employment and source of income. There is need to establish the economic viability of catfish farming in Mokwa-township, for proper advice to prospective investors. The fish farms in Mokwa Township were enumerated in a farm management survey. Simple random sampling technique were used to select seven of the catfish farms from fifteen catfish farm in the study area. There were observed from the beginning to the end of production in a cost-rout approach for two production period. The Gross margin analysis, profitability ratios and multiple regression analysis were used to analysis the result. The result showed that feed input accounted for 80 percent of the total cost of production while fingerlings accounted for 8.6 percentage, labour and medication account for 10 and 1.1 percent. The total variable cost was ₦340, 475, feed, fingerlings, and labour accounted for ₦273, 782, ₦29143, ₦34, 071 respectively. The gross revenue was ₦461, 643 and the gross margin was ₦121, 168. The net profit margin of 26.06 percent. Based on the result of this study, catfish farming is viable and profitable in the study area. It is therefore recommended for prospective investors.

Keywords: Economic, Viability, Catfish, Farming, Township

INTRODUCTION

Aquaculture is the farming or growing of an aquatic organism in a controlled and confirm environment. It is the faster growing food producing sector, which continue to increase in volume and value of output in many countries of the world, filling the gap between the supply and demand for fish and fishery products. It improving nutrition, creating new or additional employment and contributing to the household economy particularly in rural areas (FAO 2010).

Fish farming plays an important role in global efforts towards eliminating hunger and malnutrition by supplying fish and other aquatic products rich in protein, essential fatty acids, vitamins and minerals. According to Mohammed *et al.*, (2014), Fish contains essential amino acid lacking in plant protein source such as methionine, tryptophan and lysine, Vitamins such as A and D, Mineral such as phosphorous, calcium and Sulphur and also contains low levels of cholesterol, which are essential for human healthy growth. Fish has higher feed conversion efficiency than most farm animals transforming 70 percent of their feed into flesh and when compared with livestock farming, it require less space, time and money (FAO 2001)

World fish farming has increased tremendously during the last fifty years from a production of less than a million tonnes in the early 1950s, 11million tonnes in the year 1986, 48.1 million tonnes in the years 2005 (FAO 2007) and 52.5 million tonnes in 2008 (FAO 2009), with an average annual growth rate of 8.8 percentage, while Asia-pacific region continues to dominate the aquaculture sector accounting for 89.1 percentage of global production with china alone contributing 62.3 percentage of global production (FAO 2010), while fisheries including aquaculture make a small contribution to the national economic of Africa ranging from 0.48 percentage in Nigeria, 1.1 percentage in Tunisia and 5.3 percentage in Gambia (Staia 2011). According to FAO (2011) Aquaculture directly create 12 million full time jobs which significantly contributes to the national GDPS in many developing countries with appropriate management, the sector appears ready to meet the expected short fall in fish supply for the coming decades and to improve global food security (FAO,2007)

Nigeria fish demand is about 2.1 million tonnes per annum and domestic fish production estimated at about 800,000 metric tonnes with a short fall of about 1.3 million metric tonnes (Ahmed, 2015), this makes Nigerian one of the largest importer fish in the developing world and this huge importation bill is affecting the economy of aquaculture production in term of growth and development.

Fish farming in Nigeria is practices from concrete and earthen fish pond which are mainly catfish production and it is faced with so many challenges ranging from high cost of fish feed, lack of technical known how, poor management skills, uncoordinated and unstructured marketing system (Omitoyin, 2006). Therefore efficient management

of fish production through proper utilization of inputs and minimization of challenges will ensure better returns to fish farming. The increase in production efficiency as a result of efficient utilization of input resources would lead to an improvement in farmer's well-being. According to Ojo *et al* (2013) the ability to quantify efficiency and its joint determinant would provide farm manager (decision maker) with a control mechanism with which to monitor the performance of the enterprise. This study is aimed at assessing the economic viability of Catfish farming in Mokwa township of Niger State, Nigeria

Study Area

The study was conducted at Mokwa township, the headquarter of Mokwa local government area of Niger state, Nigeria. Mokwa township is geographically located on latitude 09^0 18" N and longitude 05^0 04" E of the equator with annual rainfall of 1300m to 1500m and temperature range of 22^0C to 36^0C. The main source of livelihood in Mokwa economy are trades and agricultures actives which makes it more of commercial and business center.

MATERIALS AND METHODS

Sampling procedure

The fish farms in Mokwa township were enumerated in a farm management survey. Simple random sampling techniques was used to select seven farms from fifteen catfish farms in the study areas, there were observed from the beginning to the end of production in a cost-rout approach for two production period. This method ensure that every catfish farmer were given an equal chance of selection. During the production process, the cost of any economic activities were recorded.

Data collected were numbers and cost of fingerlings stock, cost of transportation, weight of feed intake, cost of labour, total weight gain at harvest in kilogram, cost of medication, and size of the pond in meter square (m^2) during production period.

Data analysis methods

Data collected were analysed using descriptive statistics such as mean and percentage, the analytic techniques such as gross margin analysis were used to examine the cost and return and the viability of fish farms in the study area, while inferential statistics such as multiple regression analysis was employed to measure the determinant factors on the fish out levels.

The analytical tools used for the analyses were;

$$GM = TR - TVC$$
$$NP = TR - TPC$$
$$TPC = TVC + TFC$$
$$NPM = \left(\frac{GM}{TR}\right)100$$
$$TR = QP$$

Emokaro *et.al*, 2010

Where: GM = Gross margin, TR = Total revenue, TPC = Total Production cost, TFC = Total Fixed Cost
TVC = Total Variable Cost and NPM = Net Profit Margin

The viability of the catfish farms were determined using the following profitability ratios:

$$BCR = \frac{TR}{TC}$$

$$ROR = \frac{NP}{TC}$$

$$GR = \frac{TC}{TR}$$ Olagunju *et.al*, 2007

Where BCR= Benefit cost ratio, ROR= Rate of return, GR= Gross ratio, TC= Total cost, NP= Net profit

The multiple regression analyses used were specified as

Implicit form of the model
$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6 U_i)$$

Explicit form of the model are as follows
$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e_i$$
$$\ln Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e_i$$
$$\ln Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + e$$

Adeniye et. al, (2015)

Where Y = Total revenue, X_1 =Cost of fish feed (NGN), X_2 = Labor cost (Man per month), X_3 = Cost of fixed input (NGN), X_4 = Cost of fingerling (NGN), X_5= Cost of Medication (NGN), Ui = Error term, β_0 = constant term or intercept and β_1- β_2 = parameter to be estimated
The linear, semi log and double log production function were evaluated using ordinary least square method. Based on the value of the co-efficient of determination (R^2) statistical significant and economic theory that support fish production, the lead was chosen.

RESULTS

Gross Margin Analysis

The production cost, total revenue and pond size varies from different catfish farm in the study area. The catfish farm A had production cost of ₦21416 and revenue of ₦273,000 with average pond size of $13.5m^2$ while catfish farm B, C, D, E, F and G had production cost of ₦254,032,

₦282318, ₦522900, ₦365,026, ₦473,962 and ₦384,876 and revenue of ₦290,500, ₦336,000, ₦702,000, ₦503,750, ₦638,750 and ₦487,500 with average pond size of 12.5m^2, 30m^2, 50m^2, 40m^2, 45m^2 and 38m^2 respectively.

The gross Margin analysis of average fish production is describe in Table 1, which shows the Probability of the catfish farming in the study area, and it indicate that feed input accounted for 80 percent of the total cost of production which were significant at 5% level. The table also shows that fingerlings accounted for 8.6 percentage while labour and medication account for 10 and 1.1 percent of total cost of production. The total variable cost was ₦340,475 per production cycle, feed, fingerlings labour and medication accounted for ₦273,782, ₦29143, ₦34,071 and ₦3,621 respectively. The gross revenue was ₦461, 643 and the gross margin was ₦121,168. The difference between average return and average cost was estimated to be ₦104,996 with net profit margin of 26.06 percent.

Viability Analysis

The viability analysis of fish farms is described in Table 2. The average benefit cost ratio (BCR) was 1.25 which were significant between the farms and this indicates that total revenue covered the total cost 1.25 times, The rate of returns in fish production is 21%, this shows that for every ₦ 1.00 invested 21 kobo is realized by the fish farmer in the study area, while gross ratio (GR) of 0.79 implies that from every ₦ 1.00 return to the enterprise 79 kobo is being spent

Multiple Regression Analysis

Based on the econometric and statistical criteria, the linear equation was chosen as the lead equation and the results were presented in the table 3. The R^2 for the estimated regression showed that about 99% of variation in total revenue of the fish farms from the study area were explained by the explanatory variable while the remaining 1% are unexplained, this is due random to variable (Ui). Two of the estimated coefficients (that is fingerlings and feed) have positive signs which indicated that an increase in any of the two variable would increase the level of total revenue of the fish farmer ceteris paribus. The cost of feed was significant at 5% level. The coefficient of labour and drug have negative signs, which indicate that an increase in any of these variable would decrease the level of total revenue of the fish farmer ceteris paribus.

Table 1: Gross margin analysis of average fish production

Parameter	Average Cost per fish farms	Percentage
Cost of fingerlings	29143	8.6
Cost of feed	273782	80
Cost of labour	34071	10
Cost of medication	3621	1.1
Total variable cost	340475	
Fixed cost		
Total production cost	356647	
Total revenue	461643	
Gross margin	121168	
Net profit	104.996	
Net profit margin	26.06	

Table 2: Profitability analysis of fish farms

Parameter	A	B	C	D	E	F	AV
BCR	1.30	1.14	1.19	1.34	1.38	1.35	1.25
ROR	0.28	0.14	0.19	0.34	0.38	0.35	0.21
GR	0.78	0.88	0.84	0.75	0.73	0.74	0.79
FCR	1.05	1.02	1.05	1.1	1.11	1.10	1.07

Table 3: Determinant factor of fish production

Parameter	Coefficient	Standard Error	P-Value
Cost of fingerling	2.984043	3.502946	0.457
Cost of feed	1.46684	.220037	0.007 *
Cost of labor	-.3811462	2.7002	0.897
Cost of medication	-2.082186	8.424669	0.821
-constant	|-6202.304	30484.31	0.852

DISCUSSION

Gross Margin Analysis

The production cost, revenue and pond size in m^2 from these study varies along catfish farms, and these may be due to the level of capital invested. The Gross margin is a good measure of profitability (Olagunju, *et. al*, 2007), the result presented in table 1, showin that catfish farming is profitable in the study area. The high cost of fish feed from this study, is in agreement with Akande *et al.*, (2014) which said that fish feed in aquaculture represents between 60%- 80% of the variable cost of production. Which indicated that total revenue is significantly determined by feed cost, and this result is consistent with the finding of Adewuyi *et al*., (2010) and Yusuf *et al*., (2002). The Low cost of fingerling from this study is probably due to the proximity of the study area to the National Institute for fresh water fisheries research new Bussa, and lower cost of labours, indicated cheaper availability of manpower in the study area.

Viability Analysis

The average benefit cost ratio BCR of the farms studied were 1.25 indicating that the catfish farming deliver a positive net present value to the farms and the investors, and this is in line with the study of Emokaro *et al*., (2010) and Emokaro and Ekuwe (2009). The return to the investment of the fish farms is average 21% in the study area and this is lower than 88% recorded by Adewuyi *et al*., (2010) and 47% recorded by Lawal *et al*., (2014). The gross ratio of 0.79 recorded from this study is higher than 0.699 recorded by Olagunju *et al*., (2007) probably due to high cost of fish feed.

Multiple Regression Analysis

The multiple regression results showed that fish yield is significant determined by the cost of fish feed, which was significant at 5% level, and this is in collaborate with the finding of Olagunju *et al*., (2007) and also the production cost and revenue from these study do not depend on the pond size in m^2, rather it depend on the level of feed management. The coefficient of determination is in line with a priori expectation.

CONCLUSION

Based on the result from these study, catfish farming is viable and profitable in the study area. It is therefore recommended for prospective investors.

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