



FACTORS AFFECTING THE PROFITABILITY OF CATFISH PRODUCTION IN KADUNA METROPOLIS

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ABSTRACT

This paper analyze the factors affecting the profitability of catfish in Kaduna Metropolis. First, the study described the socio-economic characteristics of catfish farmers. Data was analyzed using descriptive statistics, multiple regression and gross margin. The result show results showed males (63.3%) are actively involved in fish farming than the females (36.7%). The result further indicated that the majority (80%) of the respondents are learned and educated as most of them had attended tertiary education. The results of the multiple regression model show that five (5) out of the seven (7) independent variables were positively related to the dependent variable (viability and profitability of catfish farmers). And four (4) variables; variable inputs, the amount invested, source of credit, nearness to the market were statistically significant at 5%. In estimating the cost and returns of catfish farmers, the results show that catfish farming is profitable and therefore a viable enterprise. The majority of the farmers make on average a gross margin of ₦719,232. Also, 70% of the farmers made a profit; only 30% of the farmer did not make profit because of the high total fixed cost. Therefore, it is recommended that the government should provide infrastructural facilities, such as electricity, dams, good roads, and an enabling environment for fish farmers and commercials banks should lower their interest's rates to fish farmers or would be fish farmers in order to boost fish farming.

Keywords. Factors, Profitability, Metropolis, Viability, Gross margin

INTRODUCTION

Fish farming, also known as aquaculture, involves the planned growth and cultivation of fish harvesting as food, as opposed to catching fish in the wild. It provides lucrative returns to the farmers, employment in rural areas, besides supplying good quality protein diet for the people (Onoja, 2015, Oluwatayo and Adedeji 2019). Among the common species of food fish in Nigeria are carp, tilapia, and catfish. However, catfish is the most sought after. The major reasons fish farmers in Nigeria focus on catfish are: they adapt well to culture environment; they can be retailed live; and they attract premium price (Asa & Solomon, 2015). Catfish are suitable for stocking in ponds and they tolerate low dissolved oxygen better than other common species in the country. Oguntola (2001), Asa & Solomon,

(2015) reported that catfish has a fast growth rate; are able to survive both natural and artificial food environments; and can be cross-bred to enhance certain favorable traits. Again, Catfish production, also, serves as a source of income in Nigeria; reduces the rate of unemployment in the country; and increases the country's Gross Domestic Product. However, the current fish production in Nigeria has not met up with demand for fish and fish products (FAO 2006). Out of the 35 grams of animal protein per day per person recommended by FAO, less than 7 grams is averagely consumed per person in Nigeria. These features have placed catfish farming in good position to serve as the only way of boosting fish production and thereby move the country towards self-sufficiency in fish supply.

Global fish production is peaked at about 171 million tonnes in 2016, with aquaculture representing 47 percent of the total and 53 percent if non-food uses (including reduction to fishmeal and fish oil) are excluded. (FAO 2018). Aquaculture in Nigeria focuses mainly on freshwater fish, with catfish species accounting for 64 percent of aquaculture production in 2015. According to The total fish demand for Nigeria based on the 2014 population estimate of 180m was 3,32m Mt. The domestic fish production from Aquaculture, Artisanal and Industrial fisheries for 2014 was 1.123m Mt. Over the past 35 years, aquaculture production in Nigeria has grown 12 percent a year (compared to the world average of 8 percent), from a little over 6,000 metric tons in 1980 to nearly 307,000 metric tons in 2016. The country is the largest aquaculture fish producer in sub-Saharan Africa, accounting for 52 percent of the total. (Worldfish 2018). Fisheries is estimated to employ over 8.6 million people directly and a further 19.6 million indirectly, 70 percent of whom are women. Currently, Nigeria produces just over 1 million metric tons of fish, leaving a deficit of over 800,000 metric tons, which is imported annually. (worldfish 2018). Also in 2014, fisheries in Nigeria contributed 0.48% to the Agriculture GDP and contribution of Agriculture to GDP (2014) was 20.24%. Nigeria has been ranked 68th within the group of 160 countries in terms of fish consumption per capita, 19 places above the position seen 10 years before 2014. Fish consumption per capita reached 13.3 kg in 2017 in Nigeria, according to FAOSTAT, below to the world's average of 20.5 kg in 2017. The increase in population in Kaduna State is adjudge to provide market for production



of catfish as this will in turn increase the demand for fish. Fish is produced and consumed mainly in the state and other states like Maiduguri supplied fishes to meet the teeming demand.

Despite the huge fish potentials with an increasing interests in the sector in Nigeria (Shimang, 2005;), there is still a gap between the demand for fish in Nigeria (1.3 million metric tonnes annually) and its supply from domestic production (about 0.45 metric tonnes annually) has continued to widen (Oluwasola & Ajayi, 2013). Fish farmers are is bedeviled with inadequate knowledge and technology for fish production resulting into low production efficiencies and profitability, high cost of quality inputs like feeds, seeds and equipment's. Inadequate technical & business management support systems; Ineffective data collection and management systems and Poor organization and trust amongst aquaculture value chain players. Therefore, this paper seeks to examine the determinants influencing the production of catfish in Kaduna state metropolis with a view to determining its effects on employment generation, poverty alleviation and enhanced nutrition among the urban population. More specifically, the paper described the socioeconomic characteristics of fish farmers in Kaduna state Metropolis, analyzed costs and returns to catfish farming and determined the factors affecting the profitability of catfish production.

METHODOLOGY

The study was carried in three (3) local governments of the State namely, Chikun, Kaduna North and Kaduna South respectively. The State lies between Latitude: $10^{\circ} 31' 35.08''$ N and Longitude: $7^{\circ} 26' 19.64''$ E. The State had an estimated population of 6,066, 562 million based on 2006 provisional census figures (NPC 2006) and based on annual growth rate of 3.0 the projected population of the state in 2021 was 8,978,511million. Primary data was used for the study. A multistage sampling procedure was used to select respondents for the study. In the first stage, Kaduna state was selected purposively because of growing population and the ready market for a fish farming business. In the second stage the three (3) local governments (Chikun, Kaduna South, and Kaduna North) were selected because of it is the center of economic activities in the state and

the average per capita income in these local governments is high. Thirdly, a list of names of fish farmers was obtained from the Agricultural Zonal office (Birnin Gwari) of the State and finally, simple random sampling was employed in the selection of cat fish farmers and sixty catfish farmers were sampled.

Analytical Techniques

Analytical methods employed include descriptive statistics, Gross Margin model, and multiple regression model. Descriptive statistics such as, frequency table, percentages, and averages were used to analyze the socioeconomic variables. Profitability of catfish production was estimated using the gross margin. Gross margin is the difference between total revenue and total variable cost. Factors affecting the profitability of cat-fish was determine using multiple regression model.

RESULTS AND DISCUSSIONS

Table I shows the results of the socio-economic characteristics of fish farmers in the study area. The results revealed that males (63.3%) are actively involved in fish farming than females (36.7%). This is in line with artisanal fishing, where fishing is male-dominated (Ele, 2008). It also shows that the farmers that are actively involved in fish farming fall within 45 and 54 years and this means that the farmers still have the strength to run the business. The result further indicated that the majority (80%) of the respondents are learned and highly educated as most of them had attended tertiary education. This means that education influences the adoption of practices in modern agriculture (Jatto *et al.*, 2013). The reason has been that an educated person is more likely to adopt modern practices easily, better innovations and hence could be a better producer. The study also reveals that majority of the farmers were civil servants (40%), while Business owners accounted (25%), fish farmers (21.7%) this means that they took fish farming as their primary occupation, and pensioners (13.3%). This agrees with Adewuyi *et al.*, (2010) as 79% of fish farmers were not full-time farmers. Farming experience accounted for (56.7%) which means that most farmers have been engaged in fish farming for 6-10 years.



Table 1: Socioeconomic Characteristics of fish farmers

VARIABLE	FREQUENCY	
PERCENTAGE		
Age		
25-34	03	5.0
35-44	04	6.7
45-54	26	43.3
55-64	12	20.0
65 and above	15	25.0
	60	100
Gender		
Male	38	63.3
Female	22	36.7
	60	100
Educational background		
No formal Education	0	0
Primary Education	02	3.3
Secondary Education	10	16.7
Tertiary Education	48	80.0
	60	100
Occupation		
Fish farmer	13	21.7
Civil servant	24	40.0
Business owner	16	25.0
Pensioner	07	13.3
	60	100
Farming Experience		
<5	09	15.0
6-10	34	56.7
11-15	11	18.3
15 and above	06	10.0
	60	100

Field Survey 2021

Factors affecting the Viability and Profitability of Catfish Production

To determine the factors that affect the profitability of fish production by fish farmers, multiple regression was employed thus the implicit model is given as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + e.$$

Where;

Y = the profit level of fish farmers (Naira)

X_1 = Amount invested (Naira).

X_2 = Stocking density (m^2)

X_3 = Cost of inputs (Naira)

X_4 = Labour employed (man-days/hour)

X_5 = source of credit (yes or no)

X_6 = nearness to market (km)

X_7 = Feed (kg)

e = error term

$\beta_1 - \beta_6$ = Unknown scalar parameters to be estimated as elasticity

β_0 = constant

The explicit function is given as: Profitability = (Amount invested + Stocking density (number of fish per pound size), + fixed input, variable input + Labour employed + source of credit + nearness to market + feed (kg) + error term)

The viability of catfish production was best estimated using multiple regression model specifically, the coefficient of the variable input (0.05515) is positive with a standard error of 0.070512. It implies that an increase in the quantities used of this input would result to increase in output which would translate into increased profit, Amount invested has a coefficient of 0.34242 with a standard error of 0.004332. This result aligns with prior expectations. The implication is that amount invested increased the profit level of catfish farmers in the study area. This result agrees with Nwaobiala (2010), where output and profit levels of smallholder fish farmers related positively with the amount invested in the enterprise. The results showed that the source of credit of the fish farmers was found to be positive and significant at 5%. The coefficient of the source of credit is 0.03129. This implies that the profitability of catfish production has the likelihood of being increased by 0.03129. It further implies that the more

catfish farmers have accessed to the source of credit the greater they embark on large scale production thus higher returns.

The results showed that nearness to market was found to be positive and significant at 5%. The coefficient of age is 0.01430. This implies that the viability of catfish likelihood is increased by 0.01430. This may be because the closer catfish farmers are closer to urban areas where the demand for catfish is high, the more viable and profitable it will be. Feed was found to be significant and positively related to the profitability of catfish farming. The coefficient for feed is 0.04545. The results of the estimated parameters show that the feed consumed has a positive coefficient. This implies that feed contributes positively to the output of catfish, fish foods consist of natural food and artificial (supplementary) feeds. When fish have a balanced diet to eat, they grow fast and stay healthy. The other variables that have a negative relationship with the viability of catfish production are stocking density and Labour employed. These two variables have a diminishing impact on sources of livelihood in the study area

Table 2. Factors affecting catfish production

<i>Variables</i>	<i>Coefficients</i>	<i>Standard Error</i>	<i>Marginal Effect</i>	<i>P-value</i>
Constant	0.32165	0.150485	-0,58432	0.560555
cost input Amount invested (N)	0.05515	0.070512	1.218233	0.015755
Stocking density	-0.00875	0.002389	-0.73107	0.466321
Labour employed	-0.07985	0.030114	1.507704	0.137915
source of credit	0.03129	0.013324	1.624560	0.045751
nearness to market	0.01430	0.020874	11.53602	0.004206
Feed	0.04545	0.092947	0.496162	0.692978

Estimating the Cost and Returns/Profitability from Fish Farming Production

To estimate the cost and returns/profitability, the gross margin model was employed, the following formula was used:

$$NPM = \frac{GM}{TR} \times 100$$

$$TVC = TVC + TFC$$

Where:

GM= Gross Margin,

TVC= Total Variable Cost,

NPM= Net Profit Margin,

TR= Total Revenue;

TFC= Total Fixed Cost;

TC= Total Cost

Table 3: Cost and Returns of Catfish

Item/Cost	Cycle (4months) ₦
A. Variable Cost: Juveniles/fingerlings stock per pond, feeds, family labour, hired labour, medication, maintenance and transportation.	14,579,301
B. Fixed Cost: Depreciation ponds/equipment (land, pond, boreholes, generator, scales, and pipes, vehicles, pumping machine, septic tank, buildings and other structures.)	9,261,362
Total Cost A & B	23,840,663
Total Revenue: from sales of fish	50,102,114
Average Variable cost	224,673
Average total Cost	417,446. 01
Average total revenue	998,896
Profit (Total Revenue-Total cost)	29,956,321
Average profit	478, 235.5
Gross Margin(TR-TVC)	35,522,813
Average Gross margin	719,232
Average NET Margin (%)	70%

The result of the gross margin analysis of catfish production in the study area reveals that the respondents spent average of ₦224,673 on the



average variable cost and ₦417,446.01 on average total cost. Also the average revenue/income generated from catfish indicated ₦998,896 with average profit of ₦478,235.5 and gross margin of ₦35,522,813 with average gross margin of ₦719,232. This implies with the capital invested in cat fish farming resulted in a high income realized from the fish farming. The results also shows that the higher the invested capital the higher the higher the income realized from cat fish farming. Furthermore, the analysis of gross margin indicated that catfish farming is profitable and viable and has contributed positively to the total income of respondents in the study area.

CONCLUSION AND RECOMMENDATION

This study has shown clearly that catfish farming is not only profitable but equally viable in the study area. All stakeholders must, therefore, endeavor to play their part in ensuring the survival and sustainability of the fish production in the State. The high initial capital outlay could serve as a discouragement for would-be catfish farmers who may be resource-poor, thus resulting in fewer people engaging in catfish production, this will lead to low fish supply. Because of meeting the increasing demand for protein intake by filling the yawning gap between the demand and supply of catfish in the state. It is therefore recommended that Farmers should be encouraged to give more attention to farm activities such as supervision and management in other to gain the relevant experience in running a catfish farm and increase their technical efficiency and Young and energetic youths should be encouraged to engage in catfish farming especially around their homes. Also, government should fund researches aim at finding cheap alternatives source of feeds for feeding catfish. Government as a matter of legislation compel commercial banks to provide low interest loan to fish farmers.

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