



PROFITABILITY ANALYSIS OF CATFISH PRODUCTION IN ADO-EKITI, EKITI STATE, NIGERIA

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ABSTRACT

Fish is a valuable source of protein rich in essential amino acids and crucial for human health and economic growth. The study assessed the profitability of catfish production in Ado-Ekiti. A multi-stage sampling procedure was adopted to randomly select 90 registered fish farmers, using structured questionnaires to collect primary data. Descriptive statistics and farm budgetary analysis were used to achieve the study's objectives. The findings revealed a mean age of 49 years, 58% female, 71% married, and 73% educated, with an average household of 5 persons. The average total revenue per production cycle was ₦1,185,662.22, while the total cost was ₦ 1,037,295.10, consisting of ₦717,872.88 as total variable costs and ₦ 319,422.22 as total fixed cost. The net farm income was ₦148,367.12, with a gross margin of ₦ 467,789.34 and RoI of 14%. The profitability ratio was 0.13, suggesting for every ₦1 invested into catfish production, 13% (₦ 0.13k) was generated as profit. However, poor road networks with a mean of 2.44, and inadequate capital with a mean of 2.40 were the major challenges associated with catfish production. The study concludes that catfish production is relatively profitable in Ado Ekiti. Therefore, it is recommended that the State Government ensure adequate provision and maintenance of a good road network, and develop a robust cold chain infrastructure based on Public-Private Partnership (PPP) to reduce post-harvest losses and maintain product quality in the study area.

Keywords: Catfish, Profitability, Protein, Farm, Budgeting

INTRODUCTION

Fish is a valuable resource with nutritional and economic importance. It's a great source of protein, containing essential amino acids crucial for human health and development (Tilami & Sampels, 2017). Rich in nutrients, fish provides omega-3 fatty acids, vitamins D and B12, and selenium (Wright *et al.*, 2018). Beyond human consumption, fish is also vital in animal feed, supplies raw materials for various industries, and supports over 1.48 million jobs in Nigeria's fisheries sector (Odioko & Becer, 2022). The Food and Agriculture Organization (FAO, 2020) highlights fish's significance in the Nigerian diet, particularly in the south, where it's a staple food and a relatively affordable source of animal protein.

Fish farming, as defined by Abdulrahman (2022), is a form of aquaculture that focuses on the breeding and raising of fish for commercial purposes. This is achieved through artificial means, which means that fish are raised in controlled environments rather than natural bodies of water. Nigeria stands out in this sector, holding the impressive title of the leading aquaculture-producing nation in Sub-Saharan Africa. This highlights the country's significant role in fish production within the region and underscores the economic and social importance of fish farming in Nigeria. According to Ogunji and Wuertz, (2023), Nigerian aquaculture production rose to more than 300,000 metric tons in 2015 from about 2000 metric tons in 1960 and dropped to 260,000 in 2020 due to the COVID-19 pandemic. However, this figure has since improved with Nigeria producing over 1 million metric tons annually, and this has contributed about 1.16% to the national GDP in 2021 and 0.47% in 2022 (Abba, 2023). With a growing population of more than 220 million people and the growing awareness of nutrition in Nigeria, the high demand for fish products as a source of protein has led to a steady demand for fish in local markets, restaurants, and households. The estimated annual average per capita fish consumption in Nigeria is between 11.2 and 13.3 kg per person (Ogunji and Wuertz, 2023) and this is still lower compared to the world's average of 20.3 kg/capita/year (Bradley *et al.*, 2020). The average Nigerian



consumes about 40% of their animal protein from fish, which has been shown to help treat malnutrition-related disorders (Legbara, 2019).

Nigeria's domestic fish production currently hovers around 1.2 million metric tons. The majority of fish farms are small-scale farmers, utilizing ponds ranging from 0.02 to 0.2 hectares for earthen ponds, and 25 to 40 meters for larger concrete pools (Kehinde, 2022). This production level falls significantly short of the national demand of 3.6 million metric tons annually, necessitating substantial fish imports to meet the shortfall. Odifa, (2023) observed that while Nigeria significantly reduced its fish import costs in 2022, spending approximately ₦122.5 billion (around USD 270 million) compared to ₦265.4 billion (approximately USD 580 million) in 2021, leading to a 53.84% reduction, a substantial gap remains between domestic fish production and national demand. Even with this reduction in imports, the country still relies heavily on imports to meet its fish consumption needs. Ado Ekiti, the capital of Ekiti State, presents a promising opportunity for catfish farming due to its favourable climatic conditions, abundant water resources, and growing local population, suggesting potential for increased domestic production. According to the Ekiti State Digest of Agricultural Statistics (EKSDAS, 2021), Ekiti State's total fish production in 2021 was 3,191,502 kg (3,191.50 metric tons). This is made up of 3,164,240 kg (3,164.24 metric tons) from aquaculture and 27,262 kg (27.26 metric tons) from artisanal, respectively. Out of these figures, about 300 metric tons, representing 9.1% of the State fish production, are produced within Ado Ekiti. Catfish (*Clarias gariepinus*), typically grown in ponds and tanks, is the most farmed species in Ekiti State, constituting 99.9% of the total aquaculture production by volume (EKSDAS, 2021). A large number of small-scale fish farmers in Nigeria concentrate on catfish farming due to a variety of features attributed to catfish. For example, catfish can easily adapt to their environment with a fast growth rate and reduced production cost, stock in ponds, and be easily sold live at a good market price with a rich source of high-quality protein, which is highly demanded as food in Nigeria (Oladimeji, 2017).

Despite the considerable opportunities and advantages within Nigeria's fisheries and aquaculture sectors, catfish production remains significantly below its potential. The nation's annual fish demand is approximately 3.6 million metric tons to feed its population of over 220 million, yet the combined supply from capture fisheries and aquaculture only reaches about 1.2 million metric tons. This large deficit highlights a substantial opportunity for investment and growth in catfish production, especially considering that catfish accounts for a significant 65.61% of national aquaculture production (Ogunji & Wuertz, 2023). Therefore, this study aims to provide a comprehensive profitability analysis of catfish production in Ado Ekiti. By examining crucial factors such as production costs, revenue generation, and key economic indicators like Return on Investment (ROI) and Profitability Ratio (PR), the research will offer valuable insights into the financial viability of catfish farming in the region. Specifically, the study described the socio-economic characteristics of catfish farmers, determine the profitability of their operations, and identify the challenges faced by catfish farmers in Ado Ekiti.

METHODOLOGY

The Study Area

The study was conducted in Ado-Ekiti Local Government Area of Ekiti State. Ado-Ekiti is a town and the capital of Ekiti State. It is located between the latitude $7^{\circ} 37' N$ and longitude $5^{\circ} 13' E$. It is bordered to the south by Ikere and Isi Orun, to the east by Gbonyin, to the north by Ido Osi, and then to the west by Ekiti West and Ijero local government areas. The Local government area is subdivided into 13 wards, with an estimated population of 562,467 as at 2021 (EKSBS, 2021). The main language spoken by the indigenes of Ado Ekiti is the Ekiti dialect and Yoruba language.

Sampling Procedure and Sample Size

A two-stage sampling procedure was adopted in selecting registered fish farmers for the study. The first stage involved a random selection of six (6) communities from the Ado-Ekiti metropolis which include Ado-Ekiti main town, Ajilosun, Moferere, Oke Ila, Falegan (Ilawe road), and Ajobamidele. The second stage was the random selection of 15 small-scale catfish farmers from each



community, making a total of 90 catfish farmers constituting the sample for the study. Primary data were collected using structured questionnaires designed in line with the study's objectives.

Method of Data Analysis

Descriptive statistics and farm budgetary analysis were used to achieve the study's objectives. Descriptive statistics such as percentages, frequency distributions, mean and standard deviation were used to describe the socio-economic and institutional characteristics of the catfish farmers, while farm budgetary analysis was used to evaluate the costs and return components and the profitability of the catfish enterprise in the study area. According to Omolayo (2018), a farm budget is a detailed physical and financial plan for the operation of a farm for a certain period. The farm budgetary analysis, therefore, helps to determine the total cost and revenue accrued to the enterprise within a specific production cycle. The Gross Margin Analysis (GMA) is one of the simplest analytical tools used in farm management to evaluate the efficiency of an enterprise (or farm plan) to assess and compare the various enterprises existing within the farm business. Gross margin (GM) is the difference between the Total Revenue (TR) and the Total variable cost (TVC). The model for estimating farm budgeting techniques is outlined thus:

$$GM = TR - TVC$$

where: TR = Total Revenue

TVC = Total Variable Cost

TR was obtained by multiplying the total output with market prices of the output expressed in naira. TVC comprises expenses on stocking of birds, energy & water, labour, vaccination, etc., while the Total Fixed Cost (TFC) comprises expenses on land, equipment, generators, farmhouses, etc.

The Net Farm Income (NFI) = TR – TC,

where: TR = Total Revenue

TVC = Total Variable Cost

TFC = Total Fixed Cost

TC = Total Cost (TVC + TFC)

Therefore, NFI = TR – TC

Return on Investment (RoI) = NFI / TC multiply by 100

Profitability Ratio (PR) = NFI / TR

Descriptive statistics such as mean and standard deviation were used to evaluate the extent of the challenges associated with catfish production in the study area. This was structured into Not a challenge, Minor challenge, and Major challenge, with corresponding values of 1, 2, and 3 respectively. The criteria reference or cut-off point for the mean value was 2.00 using Statistical Package for Social Sciences (SPSS). This implies that 2 and above is regarded as a major challenge, while below 2 is a minor challenge.

RESULTS AND DISCUSSION

Socio-economic Characteristics of the Catfish Farmers

Table 1 shows the socio-economic characteristics of catfish farmers in the study area. The Table revealed that the average age of catfish farmers in the study area was 49 years. This result is in line with the findings of Enwelu *et al.* (2023), who reported that most of the catfish farmers in Nigeria were people within their productive age bracket of 40-49 years. Also, 58% of the catfish farmers were female, suggesting an increase in economic participation of females leading to financial independence and improved livelihoods for the households. This finding is in contrast with Aloysius *et al.* (2020), and Kehinde (2022), who reported that catfish production is dominated by the male gender. The Table further revealed that 71% of the catfish farmers were married, with an average household size of 5 persons. This implies that married catfish farmers with a large household size may have access to additional family labour, thereby reducing labour costs. This is in line with Idris-Adeniyi *et al.* (2018), who reported that 85% of the sample respondents are married with a mean household number of 5 persons. Also, the majority (73%) of the fish farmers have formal education, with an average income of ₦1,185,662.22 per production cycle suggesting that education equips catfish farmers with the



knowledge and skills to adopt modern farming techniques for higher income and investments. This validates the findings of Enwelu *et al.* (2023).

Table 1: Socio-economic and Institutional Characteristics of the Catfish Farmers

Variable	Frequency (n=90)	Percentage	Mean
Age			49
≥ 39	14	16	
40 – 49	35	39	
50 – 59	20	22	
≤ 60	21	23	
Sex			
Male	38	42	
Female	52	58	
Marital Status			
Married	64	71	
Others	26	29	
Household Size			5
≥ 3	28	31	
4 – 9	42	47	
≤ 9	20	22	
Level of Education			
No formal education	24	27	
Primary education	20	11	
Secondary education	32	35	
Tertiary education	24	27	
Total Income – (Naira)			₦1,185,662.22
≥ 500,000	8	9	
501,000 – 1,000,000	38	42	
1,001,000 – 1,500,000	22	24	
1,501,000 – 2,000,000	14	16	
≤ 2,001,000	8	9	

Source: Field Survey, 2024

Profitability (Cost and Returns) of Catfish Production

As indicated in Table 2, the cost and returns analysis revealed that ₦1,185,662.22 was realized as average Total Revenue (TR) from the sales of catfish for one production cycle. The result also shows that an average catfish farmer invested ₦1,037,295.10 as Total Costs (TC) of production for the enterprise per cycle. These consist of both Total Variable Cost (TVC) and Total Fixed Cost (TFC). The TVC (₦717,872.88) accounted for 62.2% of the total cost, while the TFC (₦319,422.22) accounted for 30.8% of the total cost of production. ₦22,720.00, which stands for fingerlings, represents 2.2% of total cost, while feed cost (₦654,533.33) represents 63.1% of TC, which is the largest part of the production cost. Electricity (₦36,737.78) represents 3.5% of the TC, while petrol and lime (₦3,881.77) account for less than 1% of the total cost of production. The Table also revealed that the TFC for one production cycle was ₦1,037,295.10, while the Net Farm Income (NFI) realized was ₦148,367.12. The Gross Margin (GM) for the production cycle is ₦467,789.34, and the Gross Margin Ratio (GMR) is 0.37. The GMR is used to compare the GM of the enterprise to its TR. It shows how much profit the farm makes after paying its TVC. The GMR (0.47) indicates that for every ₦1 revenue generated by the catfish farmer, ₦0.39k is retained, while ₦0.61k is attributed to TVC. The table further revealed that the Return on Investment (RoI) is 0.14 (14%). The RoI is a profitability matrix that measures the profitability of an investment relative to its cost. It calculates the percentage return on investment, and it is used to evaluate the performance of an enterprise over a given period. With RoI (14%), this implies that for every N1 invested in fish production, the catfish farmer generates a return of N0.14k. The Profitability Ratio (PR) evaluates the enterprise's ability to generate profit above its production cost. The PR is 0.13, which implies that for every N1 invested into catfish farming, 13% (N0.13k) was generated as profit, while 87% (N0.87) was attributed to the total cost of



production. This shows that the catfish farming business is fairly profitable in the study area. The result of this study is in line with the submission of Idris-Adeniyi *et al.*, (2018), and Enwelu *et al.*, (2023) that catfish farming is profitable in Osogbo metropolis, Osun State and Anambra West metropolis, Anambra State, Nigeria.

Table 2: Cost and Returns for Catfish Farming in Ado Ekiti

Variable	Total Cost of Production (₦)	Mean Value (₦)	% of Mean Value
Total Revenue (TR)	106,709,600.00	1,185,662.22	
Variable Cost			
Fingerlings	2,044,800.00	22,720.00	2.2
Feeds	58,908,000.00	654,533.33	63.1
Electricity	3,306,400.00	36,737.78	3.5
Petrol	341,760.00	3,797.33	
Lime (for water treatment)	7,600.00	84.44	
Total Variable Cost (TVC)	64,608,560.00	717,872.88	69.2
Fixed Cost			
<i>(Depreciation on fixed asset @ 10%)</i>			
Ponds	1,563,800.00	17,375.56	
Generator	34,000.00	377.78	
Tank	169,000.00	1,877.78	
Pumping Machine	1,108,000.00	12,311.11	
Total Fixed Cost (TFC)	2,874,800.00	319,422.22	30.8
Total Cost (TC) = (TVC + TFC)	67,483,360.00	1,037,295.10	
Net Farm Income (NFI) = (TR – TC)		148,367.12	
Gross Margin (GM) = (TR - TVC)		467,789.34	
Gross Margin Ratio (GMR) = (GM/TR)		0.39	
Return on Investment (ROI) = (NFI/TC)		0.14	
Profitability Ratio (PR) = (NFI/TR)		0.13	

Source: Field survey 2024

Challenges associated with Catfish Production in Ado Ekiti

Table 3 shows the challenges associated with catfish production in the study area. The results revealed that poor road network with a mean of 2.44 was ranked 1st suggesting that farmers face difficulties in transporting their products to the market due to poor road conditions. Inadequate capital for investments highlights the financial constraints farmers face to access a new technology, and this was ranked 2nd with a mean of 2.40, while the high cost of feed and input which increase production cost and reduce profit margin is ranked 3rd with a mean of 2.31. These challenges were regarded as the major challenges associated with catfish production in the study area. However, price fluctuation and inadequate processing facilities make it difficult for catfish farmers to plan and invest in catfish production, thereby limiting their ability to preserve and add value to fish products, and these were ranked 4th with a mean of 2.24. The result further revealed that poor customer attitudes (2.02), suggesting a reduced demand for fish products, and the problem of market location (1.78), particularly for small-scale fish farmers, were ranked 6th and 7th respectively, indicating that price fluctuation, inadequate processing facilities, poor customers attitudes, and problems of market location were seen as minor challenges associated with catfish production in the study area.



Table 3: Challenges associated with Fish Production.

Challenges	Mean (N=90)	Std. Dev.	Ranking
Poor road network	2.44	0.69	1 st
Inadequate capital for investment	2.40	0.61	2 nd
High cost of feed and input	2.31	0.70	3 rd
Price fluctuation	2.24	0.74	4 th
Inadequate processing facilities	2.24	0.71	4 th
Poor customer attitudes	2.02	0.62	6 th
Problems of market location	1.78	0.82	7 th

Source: Field survey, 2024.

CONCLUSION AND RECOMMENDATION

This study concludes that catfish production is a relatively profitable enterprise in the study area. However, infrastructure such as poor road networks, inadequate capital and high cost of feeds reduce profitability and limit farmer's investment opportunities and growth. Therefore, it is recommended that the Ekiti State Government ensure adequate provision and maintenance of basic infrastructures, such as a good road network, and develop a robust cold chain infrastructure based on Public-Private Partnership (PPP) to reduce post-harvest losses and maintain product quality. The State Government should collaborate with agriculturally friendly banks (commercial and microfinance) to develop a farmer-friendly credit policy that will provide easy access to credit for catfish farmers at a lower interest rate, and implement targeted subsidies for essential inputs like feed so that they can expand production to meet the consumption demand in the State.

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