Anchor University Journal of Science and Technology (AUJST)
A publication of the Faculty of Natural, Applied and Health Science, Anchor University Lagos

URL: fnas.aul.edu.ng

In AJOL: https://www.ajol.info/index.php/aujst

Vol. 4 No 2, September 2023, Pp. 122 - 131

ISSN: 2736-0059 (Print); 2736-0067 (Online)

PERFORMANCE OF CATFISH (*CLARIASGARIEPINUS*) FARMING IN IKORODU LOCAL GOVERNMENT AREA, LAGOS STATE, NIGERIA

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Submitted 15 April, 2023
Accepted 4 July, 2023

ABSTRACT

Background: In a growing nation like Nigeria, where millions of its teeming people suffer from malnutrition, the need for proper nutrition is especially important. Nigerians consume a lot of fish, with a 3.6 million metric ton annual demand. Yet, there is a national demand-supply mismatch of 2.5 million metric tons, and imports are used to make up the difference at a cost of about 625 million US dollars annually. Hence, the demand-supply gap can be effectively closed by starting widespread small- and large-scale fish production.
Objective: The study examined the Performance of catfish, *Clarias gariepinus* farming in Ikorodu Local Government area, Lagos State, Nigeria.
Methods: 50 randomly selected farmers from the Ikorodu LGA completed a standardized questionnaire to gather the primary data for the analysis. The data were analyzed using descriptive statistics and an assessment of net farm revenue.
Results: The results of the budgetary analysis showed that the total cost (TC) of ₦4,234,313 ($9,993.27) was incurred, total revenue (TR) of ₦4,953,125 ($11,689.71) and a returning gross margin (GM) of ₦787,312.50 ($1,858.11) were attained. The benefit-cost ratio was 1.17, the rate of return on investment was 0.17, the gross revenue ratio was 0.16 and an operating ratio of 0.84. This indicates that catfish farming is marginally profitable due to the high cost of fish feed which was 84 % of the total cost of production in the study area.

Keywords: Catfish farming, profitability, revenue, Lagos State

1. INTRODUCTION

Globally, an estimated of 179 million metric tons of fish were reportedly produced worldwide in 2018, with a first-sale value of USD 401 billion, of which 82 million metric tons, or USD 250 billion, were generated through aquaculture (FAO, 2020). A total of 156 million tonnes, or 20.5 kg per person per year, were used for human consumption. The remaining 22 million tonnes were used to make fishmeal and fish oil for purposes other than food. Also, 46% of the total production and 52% of the fish for human consumption were produced by aquaculture. The Americas (14%), Europe (10%), China (35% of Asia), Africa (7 %) and Oceania (1 %) are the next five largest fish-producing regions (FAO, 2020). A 50 million metric tonnes increase in fish production is anticipated from aquaculture by the year 2050 (FAO, 2020). Nevertheless, with an average annual growth rate of 8.9% over the past three decades, the sector is recognized as the fastest-growing sector of food production in the globe,

https://dx.doi.org/10.4314/aujst.v4i2.2

outpacing both the production of meat from terrestrial cattle and the capture fisheries (Onada and Ogunnola, 2017). As a result, it can help ensure food security in poor countries, especially for populations in Africa that are undernourished (Anthony, 2016).

Nigeria has a total land area of 923,768 square kilometres, and in spite of this potential, domestic fish production is totally insufficient to satisfy rising domestic demand. Nigeria's population, which is currently estimated at 206.14 million, relies heavily on fish as a food source, as it is for many other coastal developing nations (FAO, 2017). The household fish consumption in Nigeria was only found to be 13.3 kg/capita/year, which is less than the global average of 20.3 kg/capita/year (FAO, 2018). Also, in a 24-hour meal recall, 52% of toddlers aged 6 to 23 months who lived with their mothers did not consume foods high in vitamin A, also, an average of 67% of infants in this age group did not consume foods high in iron (de Vries-Ten Have et al., 2020). Furthermore, 14.3 million Nigerians were classed as undernourished in 2016 (FAO, 2017), and the majority of households (58%) experience either chronic or temporary food insecurity (Ogundari, 2017).

In a growing nation like Nigeria, where millions of its teeming people suffer from malnutrition and starvation, the need for proper nutrition is especially important. Nigeria imports 2.5 million metric tonnes of fish yearly, making it one of the developing world's major fish importers (Umakhihe, 2021). Nigerians consume a lot of fish, with a 3.6 million metric tonnes annual demand. Also, there is a national demand-supply mismatch of 2.5 million metric tonnes, with imports being used to make up the difference at a cost of about 625 million US dollars annually.

The Nigerian Bureau of Statistics (2020) states that fishing in the agricultural sector fell by 2.07% in Q3 2020, compared to 5.68% in Q2 2020, 1.68% in Q3 2019, and 1.09% in 2020. Although, Nigerian aquaculture mostly focuses on freshwater fish, with 64% of production coming from catfish species (World Fish, 2018).In addition, Nigeria is the main producer of aquaculture in Sub-Saharan Africa and among the top producers in all of Africa, with small-scale farmers cultivating fish in a variety of water holding facilities, including pens, tanks, cages, and raceways, for 80% of production (Orobator et al., 2020). Furthermore, Nigeria's aquaculture business is mainly undeveloped and is characterized by limited access to soft financing facilities, a lack of technical expertise, unpredictable power supplies, and poor -quality fish seeds and feeds, all of which are limiting the sector's growth and development (Wasini, 2016; Dauda et al., 2018).

The profitability of catfish production is a crucial element in determining how long the sector can survive. In Nigeria, the majority of fish farmers are unaware of how to determine their farms' profitability (Dauda et al., 2018). Due to insufficient planning, budgeting, and production plan implementation, several farmers incur losses or cease operations after only a few years in business, as well as a lack of awareness about the viability of the agribusiness, on which they want to embark upon. This has somewhat impeded the growth of aquaculture in the nation, causing some potential farmers to

https://dx.doi.org/10.4314/aujst.v4i2.2

stay away from fish farming and others to become inactive, due to the industry's profitability issue. Besides that, Banks and other financial organizations are reluctant to lend money to farmers whose businesses cannot be realistically valued.

Without gainsaying, aquaculture can contribute more to local economic growth, poverty eradication, and stronger backwards and forward linkages (Kassam and Dorward, 2017). However, there are no empirical data on the performance of catfish farming in Nigeria arising from the use of the Jarque-Bera (JB) statistical test to ascertain the profitability of the industry. Hence, the aim of this study was to assess the viability of catfish farming in Ikorodu LGA, Lagos State, Nigeria.

2. Materials and Methods

2.1. The Study Area

Lagos State is one of the 36 states in the Federal Republic of Nigeria and is home to an estimated 12.6 million inhabitants. The state is in the southwest of Nigeria and situated in the narrow coastal flood plain of the Bight of Benin, approximately between latitudes 6o 22'N and 6o 42'N, and between longitudes 2o 42'E and 3o 22'E. It runs approximately 180 kilometres along the Atlantic Ocean's Bight of Benin's Guinea Coast, it shares borders with the Republic of Benin in the west, the Atlantic Ocean in the south, and the Ogun State of Nigeria in the east and north. Ikeja, Badagry, Ikorodu, Lagos Island, and Epe are its five administrative divisions. These divisions are further divided into 20 Local Government Areas and 37 Local Council Development Areas, and together they cover an area of 3,577 km^2 or 0.4% of the 923,773 km2 of Nigeria's entire geographical landmass. The wet season (June to November) and the dry season (December to May) are the two main seasons in the state (Britannica, 2023).

2.2. Data collection and analysis

The research was conducted in the Ikorodu LGA in the Agricultural Zone and one LGA was selected from the Eastern Zone. A straightforward random sampling procedure was used to determine the sampling size for the study location. Fifty respondents were given a well-structured interview schedule, and fifty (50) questionnaires were collected and examined. Senior socio-economists with experience in interviewing performed the interviews. Also, the study uses the focus group discussion method to gather additional information for the analysis of quantitative data. According to Parker and Tritter (2006), group discussions are frequently used to gather information about a group's feelings and opinions in relation to the study questions. Demographic statistics, fish species farmed, operational processes, feeding, and staff management were all obtained.

2.3. Statistical Analysis

Descriptive statistics, the Jarque-Bera test, gross margin (GM), gross profit margin, benefit -cost ratio, return on investment (ROI), operating ratio and net farm income were among the analytical techniques utilized to meet the study's goal (NFI). Total variable costs minus gross farm income is known as the gross margin according to Olukosi and Erhabor (1988). A decision, course of action, or policy's projected benefits and drawbacks are identified, quantified and compared using benefit-cost analysis (BCA). ROI and NFI are used to calculate the

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the return on investment and the long-term profitability of a business, respectively.

Therefore;

Benefit-Cost Ratio = ∑ Present Value of Future Benefits / ∑ Present Value of Future Costs. (1)

According to Olagunju et al. (2017), the Benefit Cost Ratio (BCR) represents the idea of the discount technique of project appraisal. They assert that a project with a cost ratio more than 1, equal to 1, or lower than 1 (CR > 1, CR = 1, or CR < 1), respectively, indicates profit, break-even point, or loss.

ROI=Net Return on Investment/ Cost of Investment ×100 (2)

Gross Profit ratio = Gross profit / Net Sales (3)

Where: net sales = (gross revenues)

Operating ratio = (Operating Expenses + Cost of Goods Sold)/ Net Sales (4)

Depreciation is calculated as follows: Cost price-salvage value (₦) / anticipated lifespan (years) (5)

GM=TR—TVC (6)

Where TR = Total Revenue

TVC = Total variable cost

By taking into account both fixed and variable costs and deducting the whole costs from the total revenue, net farm income provides an overall level of profitability for a company. Olukosi and Erhabor (1988). Therefore,

NI=GM—TFC (7)

Where;

GM = Gross Margin

TFC = Total Fixed cost

Note* Exchange rate as at 2022 = ₦423.7166

Results and Discussions

The distribution of the population sample's socioeconomic characteristics is shown in Table 1. Tertiary education was held by 94.00% of respondents, while primary education was held by 4% and post-secondary education was held by 2%. This means that the educated class, especially those with a middle level of education, dominates the population sample in local government. This is because modern aquaculture necessitates a high level of technical and scientific knowledge to be carried out successfully. The sampled local governments had a mean education level of 5.7, with a standard deviation of 0.79. Sex is extremely important in the fishing settlement community. The fact that the majority of respondents (64%) were male and 36% was female indicates that more men than women are involved in fish farming in the sample area. According to Ngeywo et al. (2015), this situation has the potential to discourage female farmers from actively participating in catfish farming; it would have a negative impact on catfish output because effective farm operations depend heavily on the participation of women. This male predominance in catfish farming may be connected to a report from the International Labour Organization (ILO) that emphasized male domination and low female participation in the majority of paid companies in many developing nations (ILO, 2016). Despite an increase in women's participation in developing economies, the majority of women continue to prioritize unpaid duties over revenue-generating businesses. This result supported the claim made by Brummett et al. (2010) that men

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Table 1: The socioeconomic profile of the catfish farmers in Ikorodu Local Government Area, Lagos State, Nigeria

Variables	Frequency	Percentage	Mean	Std. deviation
Education				
Primary Education	2	4.00		
Post-Secondary	1	2.00		
University	47	94.00		
Total	**50**	**100**	**5.8**	**0.79**
Gender				
Male	32	64		
Female	18	36		
Total	**50**	**100**	**1.21**	**0.17**
Marital status				
Married	24	48		
Single	7	14		
Divorce	10	20		
Separated	9	18		
Total	**50**	**100**	**2.2**	**0.24**
Household size	**50**	**100**		
Total	**50**	**100**	**2.1**	**0.30**
Age	50			
Total	**50**	**100**	**41.5**	**6.03**
No. of Ponds for catfish fingerling	**50**	**100**	**4.65**	**2.63**

dominate the fishing value chain. The results of this survey show that the majority of respondents (48%) were married, (14% were single), (18%) were separated, and (20%) were divorced. This finding was supported by Oladoja et al. (2008) and Olaoye et al. (2013), who found that marriage confers some level of responsibility and commitment on married people. The average household size was discovered to be 2.1 people, with a maximum of 5 and a minimum of two. This suggested that people who are better educated and based in cities tend to have fewer families (Yarhere, 2004).

The mean age was 41 years, with a standard deviation of 6.03(41.00 ±6.03), indicating that the study area's fish farming is dominated by a young and active population. The descriptive statistics in Table 2 show that the average profit is 718,813 the standard deviation of which is 288815. The average for sales is 4,953,125 with a standard deviation of 1706578, the average for TC is 4,234,313 with a standard deviation of 1434307, and the average for feed is 3,764,375 with a standard deviation of 1297000. All of the variables are skewed. The kurtosis statistics of the variables show that Depreciation and Labour are platykurtic (short-tailed or higher peak) and all other variables are leptokurtic (long-tailed or higher peak). A Jarque-Bera test reveals that the residuals of all variables are normally distributed. The goodness of fit test Jarque-Bera

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Table 2: Descriptive Statistics

	DEPR	FEED	FINGER	LAB	OUTP	PROF	SALES	TC
Mean	68500	3764375	59437.5	342000	3962.5	718812.5	4953125	4234313
Median	70000	3800000	60000	360000	4000	700000	5000000	4285000
Maximum	110000	7600000	120000	540000	8000	1650000	10000000	8350000
Minimum	30000	950000	15000	180000	1000	75000	1250000	1175000
Std. Dev.	20822	1297000	20478	133957	1365	288815	1706578	1434307
Skewness	0.0467	0.6001	0.6001	0.1588	0.6001	0.7929	0.6001	0.5377
Kurtosis	2.0827	3.9921	3.9921	1.8611	3.9921	4.6978	3.9921	3.7409
Jarque-Bera	1.4168	4.0410	4.0410	2.3298	4.0410	8.9955	4.0410	2.8423
Probability	0.4924	0.1326	0.1326	0.3120	0.1326	0.0111	0.1326	0.2414

Table 3: Average cost and return of fish production on investment

Item (Annual)	**Amount (N)**	**% of the total cost**
Feed	3,764,375.00	88.9
Fingerlings	59,437.50	1.4
Labour	342,000.00	1.6
Total variable cost (TVC)	**4,165,812.50**	
Fixed inputs	68,500.00	8.1
Total cost (TC)	4,234,313.00	
Total revenue (TR)	4,953,125.00	
Gross margin (GM)	787,312.50	
Profit	718,812.50	
ROI	0.17	
ROCE	0.70	
BCR	1.17	
Fixed Ratio	0.21	
Operating Ratio	0.84	
Gross Revenue Ratio	0.16	

Source: Computed from Field survey data (2022)

https://dx.doi.org/10.4314/aujst.v4i2.2

(JB) is used to evaluate the distributional structure of data. In order to verify the normality assumption, the JB test concentrates on the notion of sample data matching the normal distribution in terms of skewness and kurtosis. The profitability of catfish production in the research area was evaluated using the cost and return analysis, as shown in Table 3. The findings showed that of all the costs associated with producing fish, the cost of feeds accounted for the highest share (88.9%). The cost of fixed expenditures (8.1%) comes next. 1.6% of the overall cost of fingerling was labour-related. This demonstrated unequivocally that fish growers in the study area incurred significant costs for labor and feed.The fixed cost of production includes the price of fixed assets such as pumps, vehicles, aerators, and ponds, which accounted for 8.1% of total production costs.

The results also made it clear that respondents spent an average of ₦4,234,313 ($9,993.27) per year on total costs, with a gross margin of ₦4,787,312.50 ($1858.11) realizing a profit of ₦4,718,812.5 ($1,696.45). According to the rate of return on investment of 0.17, farmers who invested one naira in the production of catfish received a return of ₦1.17 and a profit of ₦0.17. As a result, fish farming in the research region is not very profitable. The findings of Ashaolu et al. (2006)'s study on the economic viability of fish farming are consistent with this conclusion.

The ratio of profit to the capital cost of production is known as the rate of return on capital invested (ROCE). It shows how much money the company makes after investing cash, according to Awotide and Adejobi (2007). The findings indicated that fish farming is profitable in the research location since the ROCE, at 70%, is higher than the current bank lending rate, at 25%. A farmer would be 45k better off after repaying a bank loan at the current rate in Nigeria if he had borrowed money to boost his fish farming. As the Benefit Cost Ratio (BCR) was greater than 1, fish farming is regarded as being lucrative. This outcome supported the findings of Olagunju et al. (2017), who found that catfish farming is a lucrative industry. The benefit-cost ratio was shown by the profitability ratio to be compatible with Olaoye et al (2013).The operating ratio was 0.84, meaning that variable costs accounted for nearly 84% of the total cost of production. This implies that the company is profitable since an increase in output at variable costs would result in a rise in total revenue while holding fixed costs constant.

Conclusion

The provision of food security and the alleviation of poverty are two additional advantages of fish production. The traditional method of catching fish in the wild has proven unproductive and is fraught with issues. Fish has been found to be a readily available source of protein for human dietary needs. Hence, the world's declining fish production, and Nigeria in particular, can be addressed through aquaculture. As a result, the study evaluated the economic viability of catfish farming in the Ikorodu Local Government Area, Lagos State. For the analysis, gross margin (GM) and net farm income (NFI) were used. According to

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the study's empirical findings, the GM and NFl were ₦787, 312.50 ($1,858.11) and ₦718, 812.5 ($1,696.45), respectively.

Catfish farming in the study area produced a profitable return on investment. Because the operational ratio, fixed ratio, and gross ratio were all positive and less than one, it can be shown that the responder got ₦0.17 for every Naira spent. This demonstrates that catfish farming in Ikorodu Local Government Area, Lagos State was reasonably profitable. In order to develop fish feed mills for the creation of premium feed at competitive prices, the study suggested that the farmers should come together to build a powerful cooperative society with the assistance of other organized corporate sectors and non-governmental groups. The use of technology and resources should also be improved, and new specialized sectors should be created. The development of the storage and processing sectors is necessary to boost the financial performance of fish farming.

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