

PROFITABILITY ANALYSIS OF CATFISH PRODUCTION AMONG SMALL HOLDER FARMERS IN OGBARU LOCAL GOVERNMENT AREA OF ANAMBRA STATE.

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ABSTRACT

This study was conceptualized to analyze the profitability of catfish production among small holder farmers in Ogbaru Local Government Area. The specific objectives were to; describe the socio-economic characteristics of catfish farmers; estimate costs and returns of catfish production and identify the constraints faced by catfish farmers in the study area. A multistage sampling technique was employed in the selection of location and respondents. The data were collected from 100 catfish small scale farmers, the primary instrument used for the collection was structured questionnaire. The data were analyzed using descriptive statistics and gross margin model. The study showed that majority of the respondents was married females below the age of 45 years. The farmers had an average total cost of N2, 199,475 and made average total revenue of N4, 050,000. This reveals a net farm income of N1, 800,525. This study concludes that catfish production is very profitable in the study area. The study recommended that educated unemployed youths should be encouraged to go into fish farming since the business is very profitable.

Key Words: Profitability, Catfish, Production, Small Holder, Farmers

1. Introduction

The increase in human population and reports of large numbers of people, undernourished or starving, especially in the developing countries has made the need for food production a major worldwide issue of concern (Oladimeji, 2017). There are three major groups of activities that contribute to food production namely, agriculture, aquaculture and fisheries. Recent knowledge showed that the world's natural stocks of fish and shell fish though renewable, have finite production limits, which cannot be exceeded even under the best management regimes. For most of our lakes, rivers and oceans, the maximum sustainable fishing limit has been exceeded (Adeyemo., Ganiyu and Olugasa, 2013). Fish production through aquaculture production will help bridge the gap of fish supply (Abiodun, 2016). 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 over the past decade (Ike & Chuks-Okonta, 2014). The average growth rate has been 8.9% per year, compared to only 1.2% for capture fisheries and 2.8% for terrestrially meat production over the same period (Oladimeji, 2017). Nigeria has become one of the largest importers of fish in the developing world, importing 600,000 metric tons annually (Oladimeji, 2017). Nigerians are large consumers of fish with demand estimate at 1.4 million metric tons. However, a demand supply gap of 0.7 million metric tons exists nationally with import making up the short fall at a cost of almost 0.5 billion US dollars per year (Kudi, Baka and Atala 2018). Fish farming is believed to be the way of bridging the gap in the short fall between total domestic fish production and the total domestic demand. Despite the overwhelming importance of catfish as a source of protein globally, low availability, low level of profit margin, low protein intake and other related constraints have remained a huge challenge even when the production of catfish seems to be on the increase. Oladejo, (2010), examined economic analysis of small-scale catfish farming in Ido local government area of Oyo state, Nigeria. Hereported that catfish farmers in the area encountered many problems in the course of their production activities, which include high cost of input, predators and finance. (Ume, Ebeniro, Ochiaka & Uche, 2016) examined the cost and returns of catfish production in Anambra State reported that high returns on investment as profit plays a vital role in the success of any business, while low returns on investment could be attributed to use of poor quality fingerlings, high cost of

feed, inadequate finance as catfish farming is capital intensive, inadequate information, traditional techniques, poor infrastructural facilities, small size of holdings and low capital investment.

Statement of the Problem

Fish is important as food, fish oil, fish skin and leather, fish meal and fish manure, medicine and disease control. Catfish production enhance the economy of Nigeria as it serves as a source of income, reduces the rate of unemployment (Emmanuel and Omotoriogun, 2010). (Ume, Ebeniro, Ochiaka & Uche, 2016) examined the cost and returns of catfish production in Anambra State reported that high returns on investment as profit plays a vital role in the success of any business, while low returns on investment could be attributed to use of poor quality fingerlings, high cost of feed, inadequate finance as catfish farming is capital intensive, inadequate information, traditional techniques, poor infrastructural facilities, small size of holdings and low capital investment. Olagunju *et al.*, (2007) also identified water pollution, inadequate supply of fingerlings, inadequate information and feed supply as constraints to catfish farming. Several studies have been done on catfish production, but the attention was more on either profitability (Ugwumba & Chukwuji 2010; Adeyemo, et al., 2013; Oparinde, & Ojo, 2014; Okoh, et al., 2021) or technical efficiency of catfish production (Onuk, 2015; Oluwasola, & Ige, 2015). Despite all these studies in catfish production none of these studies have been able to establish the fact that catfish production is profitable in Ogbaru Local Government Area of Anambra State. It is this gap that this study seeks to fill by focusing on the economic analysis of catfish production in Ogbaru Local Government Area. The broad objective of this study was to analyze the profitability of catfish production among small holder farmer in Ogbaru Local Government Area of Anambra State.

It therefore becomes imperative to carry out this research with a view to producing answers to the following research questions: What are the socio-economic characteristics of catfish farmers in the study area? What are the costs and returns of catfish production? What are the constraints faced by the catfish producers? **Research Objectives-** The broad objective of this study is to analyze the economics of catfish production in Ogbaru Local Government Area. The specific objectives are to: describe the socio-economic characteristics of catfish farmers; analyze the costs and returns of catfish production and identify the constraints faced by catfish producers.

2. LITERATURE REVIEW

2.1. Concept Catfish fingerlings

Most catfish production occurs in earthen ponds, typically 5 to 10 acres in size, with relatively small numbers produced in cages and raceways. A new production system developed in Nigeria has split-pond system, and shown to improve yields. Farmers are beginning to add these systems to their farms. Most catfish are raised in multiple-batch production. Small catfish (fingerlings) are typically stocked each spring and market-sized fish removed periodically by seining. Ponds are left for production for years without draining, as wastes are removed through natural processes within the ponds. In single-batch production, fingerling catfish are stocked and grown until almost all of the fish have reached market size, then the entire pond of fish is harvested at once, and then the pond is re-stocked (Oyibo, et al., 2020). In catfish feed production, the ground feed ingredients are mixed and sent through an extruder, resulting in feed pellets that float. To feed catfish, farmers use a truck or trailer-mounted hopper with a blower that shoots the feed pellets over the water surface. Thus, the fish feeding response is easily monitored to ensure that fish get fed enough but not too much. Dissolved oxygen concentrations in catfish ponds will decline over the night during the growing season, and farmers use aerators (typically electric paddlewheels) to increase oxygen levels in the water (Onyekuru., Ihemezie & Chima, 2019). Nigeria catfish production had declined in recent years, in part due to competition from *Pangasius* species of catfish (all catfish are within the order *Siluriformes*), imported from Vietnam and sold in the market. Some channel catfish fillets are also from Delta, Bayelsa, Cross River and River State. Tilapia products also appear to compete with catfish in certain markets. High feed prices also increased the costs of production, especially since feed is a major operating cost. Recent increases in prices paid to farmers for catfish have made catfish culture profitable again, and farmers are increasing production to fill a shortage of U.S. farm-raised catfish (Njoku & Offor, 2016).

2.2. Concept of Catfish Farming

There are hundreds of species of fishes among which are; sea trout, cyprinids, pangas catfish, silver seabream, common carp, catla, greasy grouper, bighead carp, Nile tilapia, grass carp, and so on but most of them are not suitable for fish farming in Nigeria. The most commonly seen fisheries in Nigeria are catfish and tilapia, while the former (catfish) is the most common. Because catfish

is easy to farm in warm climate like Africa, North America, Asia and so many others. Catfish business is so popular in Nigeria (Ugwumba & Chuwuji, 2010). Catfish (also known as siluriformes) as well has different species, blue catfish, channel catfish, flathead catfish, heteroclarias, clariasnigro-digitatus, clariasspp and over 300 other species. Catfish, particularly *Heterobranchius* is the specie of choice generally accepted and grown in monoculture by fish farmers in Anambra State, Nigeria (Ume, et al, 2016). Catfish are hardy, tolerate dense stocking, and thrive in a wide range of environmental conditions. 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 (Rana, 2007).

Nevertheless, 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. Catfish, *Heterobranchius bidoscarlis* has been the specie of choice and generally accepted and grown in monoculture or polyculture by fish farmers in Anambra State (Ume, et al, 2016).

Catfish is considered a bottom-feeding fish that are found in freshwater and coastal region around the world. Catfish does have a carnivorous diet since it feeds on insects, worms that are close to the river (or pond), along with amphibians such as frogs and newts and occasionally small reptiles and mammals (Onyekuru, Ihemezie & Chima, 2019). Catfish farmers also need to be aware that some enemies as well prey on catfish, depending on its size and specie. Bigger fishes, bigger reptiles, mammals and even birds could kill and eat catfish if situation accommodates their presence together (Ume et al, 2016). Female catfish spawn (that is lay eggs) close to the surface of the water where they are safe from other bottom-dwelling aquatic animals. Female catfish spawn between 10-90 eggs at a time and hatch in less than a week. Catfish farming is a branch of pisciculture. It is major form of aquaculture, farming of aquatic organisms like fish, crustaceans, molluscs and aquatic plants. What a catfish farmer does is to buy catfish juvenile, nurture them for good growth and sell them at profit (Njoku & Offor, 2016).

2.3. Theoretical Framework

Theory of Production

Production theory explains the principles in which the farmer has to take decisions on how much of each commodity it sells and how much it produces and also how much of raw material that is,

fixed capital and labor it employs and how much it will use. It defines the relationships between the prices of the commodities and productive factors on one hand and the quantities of these commodities and productive factors that are produced on the other hand. The theory describes the procedure in which a producer or farmer decides the level of his (output or products) how of his commodity to sell, the quantity of outputs to produce, the labour cost, raw material, fixed capital goods, among others. The general theory of production emphasizes that, there is always a maximum quantity of farm output which is technically possible to produce using a given combination of inputs. The production theory is based on the assumptions that; all units of variable inputs and outputs are of uniform quality and are perfectly indivisible, the technology utilized by the farm firm does not change over the production period considered and there is a maximum output from a given combinations of inputs (Umeh, et al., 2016). With all things being equal, proper combination production inputs will increase catfish output in the study area.

Production Function

The Production function signifies a technical relationship between the physical inputs and physical outputs of the firm, for a given state of the technology.

$$Q = f(a, b, c, \dots z)$$

Where a,b,cz are various inputs such as land, labor ,capital etc. Q is the level of the output for a firm.

If labor (L) and capital (K) are only the input factors, the production function reduces to –

$$Q = f(L, K)$$

Production Function describes the technological relationship between inputs and outputs. It is a tool that analysis the qualitative input – output relationship and also represents the technology of a firm or the economy as a whole.

3. METHODOLOGY

3.1 Research Design

This study employed survey design as adopted by Akpan, *et al.* (2012). This design was chosen because it is social research and normally deals with socio economic variables of the respondents.

3.2 The Study Area

The study was conducted in Ogbaru Local Government Area of Anambra State, Nigeria. Anambra State is one of the 36 States in Nigeria, it is located in the South-Eastern part of the country, and comprises of 21 Local Government Areas (LGAs). The State is sub-divided into four agricultural zones to aid planning and rural development. Ogbaru is a humid (230) tropical rain forest zone, it is located between longitude 6° 45' 1" E and latitude 6° 1' 53" N. has a boundary with Asaba in Delta State and Ndoni in River State (www.anambrastate.govt.ng 2015) Ogbaru is located by the bank of River Niger. Ogbaru people are mainly fishermen and women, farmers and are traditionally known as warriors. The LGA has 16 communities which include: Atani, Akili-Ogidi, Akili-Ozizor, Amiyi, Mputu, Obeagwe, Ohita, Odekpe, Ogbakugba, Ochuche-Umuodu, Ossamala, Ogwu-Aniocha, Umunankwo, Umuzu, Okpoko and Ogwu-Ikpele. Atani is the LGA headquarter. Ogbaru is neighbored by Onitsha, a major commercial city in Southeast Nigeria and that gives Ogbaru people quick access to the market (www.anambrastate.govt.ng.2012)

3.3 Population of the Study

The population of the Study include all the registered (1,220) catfish farmers in Ogbaru Local Government Area (LGA) of Anambra state.

3.4 Sampling Procedure / Technique

A multistage random sampling technique was adopted in the selection of communities and respondents. In stage 1, five communities were purposively selected, which were, Atani, Ogbaru, Ogwu-Aniocha, Ogwu-Ikepele, Odekpe based on prior knowledge of their active engagement in catfish farming. In stage 2, twenty (20) catfish farmers were randomly selected from each of the (5) selected communities giving a total of (100) respondents were used for the study.

Table 1. Distribution of communities in Ogbaru Local Government Area

LGA	Communities
Ogbaru	Atani, Ogbaru. Ogwu-Aniocha, Ogwu-Ikepele and Odekpe

Table 2: Distribution of Catfish farmers

Table 2: Sampling Frame and Size Selection Plan of the Study

	LGAs	Communities	Sample Frame	Sample Size
Ogbaru		5	20 (5)	100
Total		5	100	100

3.5 Method of data Collection

Data for this study were derived from primary sources which include the use of structured questionnaire, personal interviews, observations and informal discussion. Structured questionnaire was used for literate farmers and interview schedules for the illiterate farmers. All the copies of the questionnaires were administered on the catfish farmers. In collecting such data, farmers were asked relevant questions pertaining to catfish production.

3.6 Validity and Reliability of instrument for Data collection

To ascertain the Validity of the instruments, the initial drafts will be given to three lectures from the faculty of agriculture for face and content validity. The Cronbach's Alpha correlation technique was used to ascertain the reliability of the instrument.

3.7 Data Analysis

Descriptive statistic was employed to describe objective i and gross margin analysis were used to analyze objective ii. Likert scale rating technique was used to achieve objective iii.

Mathematical Expression/Model Specification

Enterprise Budget Analysis Model

$$NP = (TR - TVC) - TFC$$

Where;

NP = Net Income or Net Returns in Naira (₦)

TR = Total Revenue in Naira (₦)

TVC = Total Variable Cost in Naira (₦)

TR –TVC = Gross Margin in Naira (₦)

TFC = Total Fixed Cost

Likert scale rating technique

A likert scale is a psychometric scale in survey research. When responding to a likert questionnaire item, respondents specify their levels of agreement or disagreement on a symmetric agree - disagree scale for a series of item statement. The scale captures intensity of their feelings. A 4 - point rating scale was employed in this study. This was regarded as strongly agree (SA), agree (A), disagree (DA), and strongly disagree (SD), with corresponding values of 4, 3, 2, and 1 respectively. The mean score (MS) of the respondents based on the 4-point rating scale was computed as = 2.50 cut off point. Based on this, any score below 2.50 (MS<2.50) was taken as a weak factor and may not be considered while those with mean score of above 2.50 (MS>2.50) were taken as strong factors and thus be considered.

4 Results and Discussion

4.1 Socio-economic Characteristics of Catfish Farmers

The socio-economic characteristics of the catfish farmers were examined under the following sub-headings; sex, age, years of experience, marital status, house hold size, educational level and source of labour.

Table1: Socio-economic characteristics of catfish farmers in the study area.

Variable	Frequency	Percentage	\bar{X}
Gender			
Male	36	32.4	
Female	64	57.7	1.64
Age			
20-30	34	30.6	
30-40	52	46.8	
Above 60	14	12.6	1.80
Marital status			
Single	38	34.2	
Married	58	52.3	
Divorced	4	3.6	1.66
House hold size			
1-3	21	18.9	
4-6	61	54.9	
7-9	18	16.2	4.56
Educational level			

No formal education	12	10.8	
Primary	20	18.0	
Secondary	64	57.7	
Tertiary	4	3.6	2.60
Years of farming experience			
1-5	18	16.2	
6-10	36	32.4	
15-20	24	21.6	2.50
Source of labor			
Family labor	34	30.6	
Hired labor	66	59.5	1.66

Source: field survey 2022

Gender

The result in table 1. shows that majority (57.7%) of the catfish farmers are female, while the rest (32.4%) were male. Sex is an important factor to consider in farming activities or any other activity that demands energy. This finding indicates that female catfish farmers dominates in the study area. This is in line with the report of Okpeke and Akarue, (2015) who reported that females were more in catfish production and marketing. **Age:** The result in table 1 reveals that majority (46.8%) of the respondents were between the age 30-40 years of age, while (30.6%) of the respondents were between 20-30 years. However, (12.6%) respondents were between above 60 years. This is slightly lower than Okpeke and Akarue, (2015) who found that majority (61.7%) of farmers in Kwara states, Nigeria were both 50 years of age. This implies that farmer in the area are dominated by an age range considered to be economically active and highly productive (Ebewore, 2013). Age is a crucial factor and determinant of attitude; age is very important in job performance (Ebewore 2013). **Educational level:** The result in table 1 shows the educational attainment of the respondents shows that majority (57.7%) of the respondent had secondary school education, (3.6%) of respondents had tertiary education, while (10.8%) of respondents had no formal education and (18.0%) of respondents had primary school. This disagrees findings disagree with Agbugba, Ihemezie and Adam (2014) who pointed that there we are more non-related farmers state of Nigeria who store however the findings of this study in the case that most participant or fish family in Ogbaru local government area are literate. **Years of experience:** The distribution of the years of experience of the farmers was presented in table 1 reveals that majority (32.4%) of respondents had between 6-10 years of farming experience, (16.2%) of respondents had between

1-5 years of farming experience, while (21.6%) had between 15-20 years of farming experience. The result implies that fish farmers in the study area were well experienced in fish production. Experience in agricultural production is an important determinant of farmers' ability to manage risks, efficiently allocate resources and make other important farm management decisions that would increase their output and income levels. A similar trend in Kwara state was reported by Okpeke and Akarue (2015). **Marital status:** The results in (table 1) reveals that majority (52.3%) of the respondents were married, while (34.2%) were single and divorced were (3.6%). This implies that majority of the respondents in the study area were married. Being married increases socioeconomic responsibility of farmers which could improve their decision-making abilities Okpeke and Akarue, (2015). Marital responsibility could make farmers make more rational decisions with high accuracy on their own, which could in turn increase their efficiency. **Source of fund of fish farmers:** The result in table 1 reports that majority (36.4%) of the respondents fund their fish farming business through commercial bank, 5.4% fund their marketing expenses through friends and relations, 5.4% fund through cooperative/issues, 10.8% sourced from microfinance bank, 10.8% sourced from personal saving, and 5.4% sourced from bank of agriculture. This report is in line with the report of Okpeke and Akarue (2015), who reported that smallholder catfish farmers depends on cooperative societies for financial support. **Household size of the respondents:** The study reveals that majority (54.9%) of the respondents have a household size of 4-6 people, (18.9%) have a household size of above 1-4 people, and (16.2%) have 7-9 people. This is an indication that the farmers in the study area have relatively large free family labour that can be used for agricultural activities in the study area. This is desirable and of great importance in farm production as rural households rely more on members than hired workers for labour on their farms. This explains why the labour source available to the farmers originates mainly from the household with little or no paid labour, Okpeke and Akarue, (2015).

Table 2: The costs and returns of catfish production in the study area.

Variable input	Unit	Quantity	Price	Total cost
Fingerlings	number	2500	35	87,500
Commercial feed	Kg	100	10,200	1,020,000
Family labor	Hr	4	1000	4,000
Hired labor	Hr	8	8500	68,000
Fuel	Litres	175	165	28,875
Water	Litres	25	100	2,500
Drugs		20	400	8,000
Liming cost		5	120	600
Transportation	Months	4	4500	18,000
Miscellaneous	Months	4	2500	10,000
Total variable cost				1,247,475
FIXED INPUT USED				
Farm equipment	Number	Unit price		Life span
Water pump	3	38,500		2 years
Borehole	1	550,000		Everlasting
Concrete pond	5	230,000		Everlasting
Earthen pond	1	10,000		Everlasting
Plastic tank	3	88,500		8 years
Plastic bowls/cups	10	3,500		4 years
Machetes/knives	8	2,800		3 years
Wheelbarrow	3	29,500		9 years
Total fixed cost		952,000		
Total cost (TVC+TFC)		2,199,475		
REVENUE				
Average quantity of fish harvested	2,700			
Average price of fish per kg	1,500			
Total revenue (TR)	4,050,000			
NET FARM INCOME (NFI)				
NFI = TR — TC	1,800,525			

Source: Field survey 2022

4.2 Costs and Returns of Catfish Production

The result of the cost and returns in catfish Production in (Table 2) estimated average costs and returns per production cycle of catfish production in the study area. The result showed that the total variable costs incurred was ₦ 1,247,475; the total fixed cost was ₦952,000 per production cycle, the total cost ₦2,199,475. The gross margin per production cycle was ₦ 2,802,525 and the estimated net farm income was ₦ 1,800,525, this indicated that catfish production in Ogbaru local government Area were profitable and seen as a good business venture. This result is in line with the report of Ume, et al., (2016) who opined that the gross margin of catfish producers was ₦322,600 with profit of ₦153,100. Therefore, catfish production is profitable and should be giving priority in the study area.

4.3 Constraints Faced by Catfish Farmers in the Study Area.

Table 3. Distribution of respondents according to perceived constraints to catfish production

Perceived Constraints	Mean	Decision rule
Poor pond facilities	2.24	Disagree
Diseases/ pest	3.87	Agree
High Cost of transport	3.12	Agree
High Cost of labour	3.98	Agree
Scarcity of healthy feeds	2.56	Agree
Lack of finance	3.34	Agree
Availability of Land	1.02	Disagree
Lack of formal education	1.26	Disagree
Climate Change	3.14	Agree

Source: field survey, 2022

The constraints faced by the catfish farmers in the area were analyzed from the information generated from the field work. The study used 4-point likert scales to capture their responses which was later interpreted as greater than or equal to 2.5 (Agree) and less than 2.5 (Disagree). Based on the ten (10) items of challenges faced by catfish farmers in the area, 7 were above the mean threshold of 2.5 while 3 were below mean threshold of 2.5 implying that the major challenges facing catfish farmers in the area include diseases/pest, high cost of transport, high cost of labour, scarcity of healthy feeds, lack of finance and climate change.

5. Conclusion

The study was carried out to investigate the profitability of catfish production in Ogbaru LGA of Anambra State. The analysis of data collected revealed the following;

Most of the catfish farmers are females who are at the very productive year of their lives (30-40 years), married with a mean number of four members of the family. The highest form of education among them is the secondary school education. Farming experience of five years and above, hired labor as the source of labor. Their major source of fund for production of catfish is commercial banks. Most of the fish farmers are wholesalers, who buy at least 1000 pieces of fingerlings and sell them to retailers at a minimum price of 900 each. At least, 100 matured catfish are sold monthly and their feed is being replenished at intervals of two weeks. The major challenges facing catfish farmers in the area include diseases/pest, high cost of transport, high cost of labour, scarcity of healthy feeds, lack of finance and climate change.

6. Recommendations

- i. Educated unemployed youths should be encouraged to go into fish farming since the business is very profitable.
- ii. There is need for training on how to use modern technology for catfish farming, as this will result in higher yield and lower energy input.
- iii. Farmers should be educated on how to formulate healthy feeds for efficiency
- iv. Catfish producers should form a cooperative society to enable availability of credits.

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