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Socio – Economic and Profitability Analysis of Catfish Production in Akure North Local Government of Ondo State, Nigeria

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Authors' contributions

The authors designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

This study examined the Socio-economic characteristics of catfish farmers, estimated the cost and returns, and determined the profitability and ascertaining the factors that affect catfish production in Akure North Local Government, Ondo State, Nigeria. The work examined the various constraints militating against catfish production in the study area. The result showed that majority (75%) of the respondents were male, 77% had formal education, while 68% of the respondents stocked between 501 to 1000 units of fingerlings. The result of profitability analysis shows that an average profit of ₦8766.40 (an equivalent of 53.24 US dollar) could be realized per month and the enterprise could be adjudged as profitable. It is recommended that fish farmers be advised to form association that would enhance expansion of operation, while the government should encourage catfish production via discouragement of catfish importation into the country as well as extending credit facilities to credit worthy catfish association.

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1. INTRODUCTION

According to Anthonio and Akinwumi [1], fish farming is the subset of aquaculture that focuses on rearing of fish under controlled or semi controlled conditions for economic and social benefits.

Fish farming activities in Nigeria Started about 50 years ago, with the establishment of a small experimental station at Onikan, Lagos, Jos, Plateau state by the Federal Government of Nigeria. This generates a lot of interest in fish farming with the involvement of other levels of Government and some private establishment Anthonio and Akinwumi, [2].

Catfish production according to Emokoro [3], (2010) is important to the Nigerian economy as it serves as a source of income, reduces the rate of unemployment and increases the Gross Domestic Product (GDP).

According to Adeogun et al. [4], Nigeria derived over 90% of fish caught from the coastal zone. The coastal zone has a high diversity of fish species which are of economic value for the people of Nigeria. There is access to over 1,800,000 metric tons of artisanal fish resources with a wide scope of increase in capture efficiency; the dermersal stock resources can produce about two million metric tons annually from the industrial fisheries. On the other hand the offshore fisheries have an untapped annual production of 100, 000 metric tons of tuna and large potential of marine shrimps and pelagic fishes.

Fish oil has a high content of poly – unsaturated fatty acid contained in omega -3 and omega -6 which are useful in reducing the possibility of heart attack in human beings Clinical. Trials have shown that fish oil supplementation is effective in the treatment of many disorders including rheumatoid, arthritis, diabetes, ulcerative colitis and Reynard's disease. Small pelagic fishes (such as clupeids), trash fish and shrimp heads are converted to meals used in the production of livestock feeds Nathan [5].

Fish farming generates employment directly and indirectly in terms of people employed in the production of fishing output and other allied business. It also generates income for all categories of people involved in fish farming and thus contributes more to the national income when compared with other livestock. It requires less space, time, money and has a higher feed conserving rate vis-à-vis the raising of other livestocks [6].

FAO [7] estimated that Nigeria imports about 500,000 tons of fish estimated at about $400,million annually while annual domestic fish supply in Nigeria stands at about 400,000 tons and thus making Nigeria one of the largest importers of fish in the developing world.

The fish importation bill 2010 has been estimated to cost ₦125.38 billion and in 2014 there was a reduction by the government on the fish import of 25% and at the same time the Nigerian fishery will be supported.

As reported at the meeting of ministers and Heads of delegations at the ministerial conference on fisheries cooperation among African States Bordering the Atlantic ocean (ATLAFCO) of September [8]. The potential of Nigeria's fisheries resources has been estimated at over 3.0 million metric tons per annum and if properly harnessed is capable of meeting the local fish demand and of generating surplus for export. The drive according to the statement is to ensure unlock of the potential using artisanal, inland, industrial fisheries and Aquaculture to increase local fish production to bridge the gap between demand and supply to complement the importation substitution drive. From the speech at (ATLAFCO) meeting, it was revealed that the Federal Ministry of Agriculture and Rural Development has embarked on a 4-year implementation plan under the Aquaculture value chain with set targets to increase the annual production of fish fingerlings by 1.25 Billion; produce 400,000 metric tons of fish feed and 100,000 metric tons of value added fish and fisheries products annually; increase table size fish production by an additional 250,000 metric tons annually and within four years, add an additional 1 million metric tons of fish to domestic fish production to attain over 67% self sufficiency. The plan also targets the creation of 100, 000 jobs per annum for the next five years which will include at least 20,000 youths and women

As fish supplies from open water and lagoons continue to fall and human offers and population rises, fish farming offers an effective ways of

generating food and income from dwindling land, fish farming has been recognized as a viable means of increasing domestic fish production. Presently live catfish attracts premium price in Nigeria with a high return on investment ranging from between 40%- 60% in some very successful enterprise [9].

The consumption of animal protein in Nigeria has been inadequate due to the unsuitable growth resource and relative decline compared to the steady growth in human population.

Fish demand in Nigeria was estimated at 1.4million metric tonnes whereas the domestic fish production of about 500,000 metric tons is supplied by artisan fisher– folk. However a demand– supply gap of at least 0.7 million metric tons exist nationally with import making up the short fall at an estimated US dollars per year Olagunju and Falola [10].

As quoted from the same report, the beauty of fish farming is that it has no season, it is all year-round and serve to bridge the gap created by the 25 percent cut in importation, and more people are needed to have interest in the business. The market for fish in Nigeria is larger than any other agricultural commodity.

Olagunju Adesanya and Ezekiel [11] reported that the advantages of catfish farming are: (i) Provision of high quality for human consumption (ii) Ensures existing farm to create additional income (iii) Enable the farmers to harvest at will as against the ones raised in wide waters (iv) Enables effective use of marginal land that is too poor for other agricultural use.

The study was conceptualized with specific objective of examining the economics of catfish production with general objectives of examining the socio – economic of catfish farmers, estimate the costs and returns; determining the profitability, and ascertaining the factors that affect the profitability of catfish farming in Akure North Local Government of Ondo State.

2. METHODOLOGY

2.1 The Study Area

The study was conducted in Akure North Local Government Area of Ondo State. It spreads over an area of about 15,911 square kilometers owned by the government with about 186,000 inhabitants [12], the communities under the Local government include Oba – Ile, Ayede Ogbese, Iju – Itaogboolu, Owode, Eleyowo and Ilu abo. The area belongs to the tropical forest with rainfall of about 1500mm annually spreading through April – October.

It has a maximum temperature range of between 27°C - 32° (Ondo State Agro climate tropical and Ecological monitoring unit Olagunju et al. [11].

Among food crops grown are maize, yam, cassava, plantain, cocoyam as well as cash crops such as oil palm, coffee, cashew, citrus, kolanut, cocoa and fish farming which is commonly practiced by the people in the riverine coastal area and some interested fish farmers in non coastal areas which is the focus of this study.

Purposive sampling technique was used to select the Local Government area based on the intensity of Catfish farmers. Six (6) communities were selected from the Local Government using random sampling method.

A survey of the Six Communities indicated that there were 125 Catfish Farmers in the Local Government Area. Primary data were collected with the use of structured questionnaires to interview one hundred and ten (110) Catfish Farmers in the area. Only 100 questionnaires were valid for analysis. The selected farmers have consistently been in Catfish production for a minimum of eight (8) years.

Data were collected on respondents socio – Economic Variables such as age, household size, educational level, fish farming experience, cost of feed, stock size, farm area, quantities and unit prices of output and input items were obtained for the determination of Net Income.

Data collected was analyzed by using percentage, frequency, statistics and Gross margin analysis.

Descriptive statistics were used to analyses Socio–Economic Characteristics of the Catfish farmers while Gross–Margin was used to analyze the profitability of Catfish production.

Gross margin (GM) is the difference between total revenue (TR) and total variable cost (TVC) the total revenue (TR) of price (P) per unit of output (Q) i .e TR = PQ

Average Gross margin percentage per annum per farmer is the difference between the total

revenue (TR) and total variable cost (TVC) divided by the total number of respondents (R) Gross Margin analysis will be used as a tool of analysis. The gross margin is a dependable analytical tool in determining the profitability of production. It is very useful where fixed capital is a negligible portion of the farming enterprise.

Profitability in a common usage means the ability to earn profit and it is affected by both revenue and costs.

Budgetary Analysis involves estimation of Total Cost (TC) of production and Total Revenue (TR). The difference between these two estimates give a measure of Net Income or Gross Margin. Gross Margin is the difference between Total Revenue (TR) and Total Variable Cost (TVC), the Total Revenue (TR) of price (P) per unit output (Q) i.e. TR=PQ

Gross Margin according to Folayan [13] is defined as the difference between the Gross Farm Income (GR) or Gross Margin (GM) and Total Variable Cost.

Mathematically, budgetary model can be expressed as

Gross Margin (GM) = GR= TR-TVC=TR-TC=profit

Where TR =GR Total Revenue=Gross Revenue
TVC= Total Variable Cost
TC = Total Cost

2.2 Measure of Profitability and Viability

Return on Investment (ROI) as well as the Internal Rate of Return (IRR) are used as measure of returns per Naira invested while the (IRR) is the amount of money that would be generated on Naira invested in a business.

$$\text{ROI like IRR} = \frac{GM}{TVC} = \frac{\text{Net Returns}}{\text{Total Cost}}$$

$$= \frac{\text{Profit}}{\text{Total Cost}}$$

i.e. $\pi / _{TC}$ where π= Profit

The higher the positive value of IRR or ROI, the more profitable an enterprise.

Gross Ratio is a measure of viability of a business and it is expressed as TC/TR. The lower the value, the more viable the business venture and thus the more profitable it is.

$$\text{i.e} \quad \frac{GM}{R} = \frac{TR - TVC}{R}$$

Where TR = Total Revenue
TVC = Total Variable Cost
G.M. = Gross Margin
R = Total number of respondents

Gross margin per respondent per month is gross margin per respondent per annum divided by 12 months i.e GM $\frac{GM/R}{12}$

3. RESULTS AND DISCUSSION

The demographic variables of Catfish Production in Akure North Local Government Area of Ondo State is presented in Table 1. With 75 percent of the respondents thus implying that men were found to be more active participant than their female counterpart in catfish production in the area of study.

The educational attainments of the respondents revealed that 77 percent of them had formal education. Education is known to have positive influence on farmers' productivity as there is positive correlation between education and adoption of technology Education which represent human capital of farmers is generally postulated to have a positive impact on efficiency of farmers [14]. This is because it facilitates the adoption of new innovations, provides consciousness, and awareness which enable decision makers to understand the various decisions to be made in their farms.

The result also revealed that all the catfish farmers indicated that they have other occupation than Catfish production. This additional occupation was reported to have cushioning effect on financial needs.

Table 2 shows that 84% of the total respondents revealed that they used their personal savings and group contribution to finance their fish production activities. Borrowing from professional money lenders were quoted by 9 % of the respondents while 7% mentioned ploughing back of profit and borrowing from friends and relatives as other sources of financing their catfish farming. This could have implication on their scale of operation. It further shows that 77% of the catfish farming operators were motivated by

profit. Thus implying that the vocation could be profitable. Furthermore, Table 2 shows that majority 95% of the respondents practice sole proprietorship. This implies there was a limit to the expansion potentials of the enterprise. Also (57%) of the respondents revealed that they hatched the fish themselves. This implies that their level of profit was enhance by reduction in production and ability emanating from the experience of majority of them to carry out hatching of the fish rather than hatching it somewhere else that depends on how expensive purchasing is compared to hatching on the farm where self-hatching farm. The Table 2 also shows that 71% of the respondents revealed that they have highest demand for fresh fish of catfish in the month of November – December every year. This implies that catfish farmers have to increase quantity of fish produced towards the months of November and December of the year provided they have increase in demand that attracts more profits.

Table 1. Demographic variables of catfish production in Akure North Local Government Area of Ondo State

Gender	Frequency 100
Male	75
Female	25
Single	29
Married	64
Widower	3
Divorced	4
No formal education	23
Primary education	14
Secondary education	38
Tertiary education	23
Adult education	2
Farming	20
Trading	46
Artisan	2
Civil servant	11
Others	21

Source: Computed from Authors field work 2012

Table 3 shows that 93% of the respondents hatch at most 1000 units of fish at a time. Also the table shows that 89% of the catfish producers used less than 1 hectare for their production. Table 3 further revealed that the price per kilogram of catfish ranged between ₦400 and ₦499.5 with the frequencies ranging between 12 and 32. Since the respondents measured their sales with scales, the research did not bother to inquire as to whether there is a difference in price of smaller or larger fishes.

3.1 Problems Encounter in the Industry

The problems encountered in the catfish farm are detailed in Table 4 as reported by the catfish farms were inadequate means of preservation, lack of organized market, inadequate capital, high cost of transportation, inadequate Government encouragement, quantity, stiff foreign competition, low quantity demand, mature fishes feeding on younger ones, fish infection outbreak, contamination of ponds, complaints of catfish having no scales. All the Catfish farmers reported that lack of organized markets and inadequate capital are their problems.

Table 2. Socio-economic characteristics of catfish production in Akure North Local Government Area of Ondo State.(N=100)

Sources of finance	Frequency
Personal saving	39
Group contribution	45
(Ajo/Esusu)	9
Professional money lender	7
Others	
Motivation for fish production	
Profit	77
Government encourage	5
Fisk level	18
Ownership pattern	
Ownership pattern	
Sole proprietorship	95
Partnership	5
Total	100
Health	
Self	57
Elsewhere	43
Total	100
Period of highest demand	
January – February	29
November - December	71
Total	100

Source: Computed from Authors field work 2012

4. RESULT OF GROSS MARGIN ANALYSIS

Table 5 shows the detail of frequency, total quantity of catfish, average selling price, Total Revenue (TR), Total Cost (TC), Profit (TR-TC), as well as the minimum, maximum mean mode and median of cost, revenue, and profit for 100 respondents respectively in the area of study.

Table 3. Quantity, price and sources of labour in catfish production in Akure North Local Government Area Ondo State. (n=100)

Quantity of fish produced per hatch	Frequency
> 500	25
501 – 1000	68
1001 – 2000	5
> 2000	2
Size of pond	**Frequency**
0.25 hectare	50
0.75 hectare	28
0.5 hectare	11
1 hectare	11
Source of Labour	**Frequency**
Family	64
Hired	36
Fish Price per kg (N)	**Frequency**
400 – 419.5	16
420 – 439.5	32
440 – 459.5	25
460_479.5	15
480 – 499.5	12

Source: Computed from Authors field survey 2012]

venture. Moreso that all the respondents reported that catfish production was a minor operation for them as they have other major operations that generate income for them.

Table 4. Existing constraints for catfish production

Problems encountered	Frequency
Inadequate means of preservation	49
Lack of organized markets	100
Inadequate capital	100
High cost of transportation	35
Inadequate Government encouragement	11
Stiff foreign competition	42
low quantity demand	47
Mature fish feeding on younger ones	51
Fish infection outbreak	43
Contamination of ponds	35
Complaints of catfish having no scale	40

Source: Computed from Author's field survey, 2012

Table 6 shows the result of Gross Margin for the catfish farmers in the area of study as ₦105,196.75 per respondent per annum. The result showed that the profit realized by catfish farmers per month was ₦8,766.40. Thus catfish production could be adjudged to be a profitable

Based on the Gross Margin Analysis in Table 6, with Gross Margin of ₦8,766.4(53.24 US dollar) per month per respondent, and Internal Rate of Returns of 1 and Gross Ratio of 0.52 as indicated in Table7, the catfish enterprise is both viable and profitable in the area of study.

Table. 5. Statics of the cost, revenue, and profit of catfish farmers (n=100) in Akure North Local Government of Ondo State

Frequency	Weight in kilogram	Average selling price per KG	Total cost (TC)	Total revenue (TR)	Profit (TR-TC)	
16	6,712	409.75	1,577,320	2,750,242	1,172,922	Minimum
32	13,736.64	429.75	3,228,110.4	5903321	2,675,210.6	Mode
25	11,243.75	449.75	2642281.3	505686.6	2,414,595.3	Median
15,	11,743.75	469.75	2759781.3	5516626.6	2,759,781.3	
12	5'877	489.75	1,38,1095	2,878,260.8	1,497,165.8	Maximum
Total (100)	49,313.14	2248.75	11,588,588	22,108,263	10,519,675	Total
Average	493.13	449.75	115,885.88	221,082.63	105,196.75	Mean

Source: Computed from the authors Field work 2012

Table 6. Gross margin analysis of catfish production in Akure North Local Government

Number of respondent (n)	100
Total Revenue (TR)	₦22,108263
TVC	₦11,588588
Gross margin	₦10,519675
Gross margin per respondent per annum = (GR/R	N105,196.75
Gross margin per respondents per month	N8,766.40

Source: computed from authors field work2015

Table 7. Gross margin analysis of catfish production showing internal rate of returns and gross ratio

Number of respondents	Total cost	Total revenue	GM	IRR=GM/TC	GR=TC/TR
Total of 100 respondent per annum	11,588,588	22,108263	10,519675	0.91	0.52
One respondent per annum	115,885.88	221,082.63	105196.75	0.91	0.52

Source: Computed from data in Table 5

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

The study focuses on the socio economic and profitability analysis of catfish production in Akure North Local Government of Ondo state. The study aimed among others to examine the socio – economic characteristics of catfish farmers and producer, it also examined the various constraints militating against catfish production in the study area so as to make recommendations.

Data for this study were drawn from primary source; the primary data were obtained through the use of well structured questionnaire. The data were purposively collected from catfish farmers drawn from four communities in Akure North Local Government and were analyzed using descriptive statistics, frequencies, percentages and budgetary analysis.

The result shows that majority (75%) of respondents were male indicating that males were more involved in catfish production, majority (77%) had formal education indicating that farmers are well educated. It was equally noted that the majority (73%) of the farmer practice at a small scale level.

Also the famers had quite appreciable year of production experience.

All (100%) of the Catfish farmers in the Area of study reported that lack of organized markets and inadequate capital are their problems.

Majority (68%) of farmer stocked between 501-1000 fingerlings depending on the size and number of ponds.

The result of profitability analysis shows that total variable cost incurred by catfish famers was about ₦11,588'588 and total revenue was ₦22,108,263. The result equally showed that an average profit of ₦ N22,557,24 was realized per month per catfish farmer. Given the level of this profit, the enterprise could be adjudged as a profitable venture.

5.1 Conclusion

The study examined the production of catfish in Akure North Local Government Area of Ondo State. All data were analyzed, the result from the study showed that males were more involved in catfish production. The farmers are married, highly experienced and well educated. Majority of the farmers had average profit of ₦8,766.40 (an equivalent of 53.24US dollar) per month. This accounts for the reason that catfish or fresh fish productions could be adjudged to be profitable.

5.2 Recommendations

- Based on the result obtained from the research work, it is hereby recommended that more of single females should be involved in the business of catfish production.
- On the basis of the fact that none of the fish farmers indicated Cooperative Society as one of the source of finance, while finance was quoted as one of the constraints of Catfish production, it is recommended that fish farmers should form Cooperative Association so that loan could be obtained from membership contribution.
- On the reported issue of inadequate means of preservation and unorganized market as a problem confronting Catfish production in the study area, it is recommended that Catfish producers should intensify efforts by finding a way of working with hotels, restaurants and frozen food operators. Also the cooperative should be able to embark on joint possession of biomass fuelled fish smoking kiln equipment for use by the members for preservation of harvested fishes, this is the oldest and clean means of fish preservation in many developing countries.
- On the issue of stiff competition, the government should embark on quota ban of fish importation. This singular act will enhance increase in the quantity of domestic fish consumption.
- In order to forestall a situation whereby mature fishes feed on the young ones, the

farmers should from time to time endeavor to separate fishes in such a way that fish of equal size are peered together.

- Problem of fish infections which incidentally are water borne resulting from pond contamination could be arrested by Catfish farmers particularly the starters by widening their scope of use of light water instead of water dirty.
- Fish farmers need to start growing tilapia and other fishes that have scales. This will to a large extent take care of complains of Catfish not having scales reported to be insinuated by some fish consumers.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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