

## **Analysis of The Profitability of Fish Farming in Warri South Local Government Area of Delta State, Nigeria.**

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**Abstract:** *This research work was designed to assess the profitability of fish farming in Warri South Local Government Area of Delta State, Nigeria. A purposively sampling technique was used to select fifty (50) fish farmers from the study area. Data collected were analyzed using descriptive statistics- frequency, percentages, while budgetary and gross margin was used to determine Farm Net Income (FNI). The study indicates that variable cost accounted for (72.95%) of the total cost while fixed cost of production accounted for 27.05%. The result shows that a total cost (TC) of ₦592,316 was incurred by a respondent per farming season while total revenue (TR) of ₦976, 622 was realized with a returning gross margin (GM) of ₦544, 528 and a net farm income (NFI) of ₦ 384, 306 per farmer per annum, thus indicating that fish farming is profitable in the study area. Constraints encountered by the farmers includes, insufficient funds, high cost of feed, lack of processing/preservation/storage facilities and market price fluctuation. The study thus recommend that government and other stakeholders should help provide cheap sources fish feed, while also making funds available amongst others.*

**Keywords:** *Fish Farming, Gross Margin, Net Farm income, Profitability, Nigeria.*

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### **I. Introduction**

#### **1.1 Background to the study**

The Nigerian fishing industry is believed to consists of three major sub –sectors, which are artisanal, industrial and aquaculture. The awareness on the potential of aquaculture to contribute to domestic fish production has continued to increase in the country. The reason for this is that there is the need to meet the much needed fish for domestic production and export, the aquaculture sub sector is said to contributes between 0.5% and 1% to Nigeria's domestic fish production. [1]. Fish farming is the fastest growing animal based food production sector, particularly in the developing countries - mainly from China and other Asian countries [2]. In Africa, the government of the continent under the tutelage of the Africa Union, have identified the great potential of fish farming and are determined to encourage private sector investments [3].

Fish is said to be an important source of both food and income to many people in developing countries. For instance in Nigeria as much as 10% of the population, some 14 million people depend wholly or partly on the fish on the fisheries sector for their livelihood, it also provides a rich source of protein for human consumption. Due to its readily digestibility and immediately utilizability by the human body, fish is thus suitable and complementary for regions of the world with high carbohydrate diet. [4]. The fish sector is also believed to provide income for over 10 million people engaged in fish production, processing and trading [3]. About \$2.7 billion (U.S) is believed to be the export value from the fish sector, however this benefits are at risk because of exploitation of natural fish stock which is believed to be reaching its limits [5].

Corroborating this view, the low level of capture fisheries which represent one of the major aspects of fish production in Nigeria has also seem to have reached their natural limits as a result of environmental degradation and over fishing, the consequence of this is over exploitation of many fish species from the wild sources. These fishes which were once considered to be vast and endless, are now being over fished and labeled as unsustainable in their present state [6].

Similarly the demand for fish in the country has been on the rise with demand far exceeding supply. Fish supply in Nigeria at present is about 800,000 metric tons while demand is put at 2.7 million metric tons, thus the country is faced with a deficiency of about 1.9 million metric tonnes. [7]. This has further lead to loss of foreign exchange with about 125 billion Naira been spent fish importation only.

Giving this scenario the only way of solving this problem is through Aquaculture. Aquaculture is an industry that encompasses the cultivation of fish (fin and shell fish) in a controlled systems for commercial recreation or resources management purposes with the aim of increasing production beyond natural limit. [8]. Aquaculture was introduced to Nigeria in the early 1950s and fish production through aquaculture has risen steadily from a few hundred kilograms to over 45,000 metric tons in 2004 [9]. Corroborating this view [10]

noted that the first trace of aquaculture in Nigeria was the practice by some missionaries in the early Oyo State, where fish was raised to supplement the protein intake of pregnant Women. He further stressed that fish farming in Nigeria, falls into two distinct periods; between 1950-1970 and 1970-1992. The 1950-1970 period popularized fish farming while the 1970-1992 period is on expansion and establishment of demonstration of fish farms in addition to bold attempts at reducing the major constraints for rapid aquaculture development .

The Nigerian government has recognized the importance of the fishery sub-sector and it made several attempts over the years to increase their productivity through institutional reforms and various economic measures. Recently, the Jonathan's led administration placed some restrictions on fish importation so as to encourage local production. According to the Federal Ministry of Agriculture and Rural Development, the structured embargo on the importation of fish into the country, with the implementation of the backward integration policy for the fisheries sector beginning January 2014. This according to the then of Minister of Agriculture, Dr Akinwumi Adesina the government is actually working on an integrated policy that will gradually deliver the country from the wasteful dependence on fish produced in foreign nations, while Nigeria's abundant aquatic resources stays untapped.[11].

### **1.2 Statement of the Problem:**

Fish farming or culture is believed to be the way of in bridging the gap in the short fall between total domestic fish production and the total domestic demand. Despite this perceived role there is a low level of fish production which is due to although resource use constraints such as feed supply, low managerial know-how, low capital have retarded the pace of development in the fish farming sub-sector , A great deal of opportunity still abounds in small scale fish farming business. [12;13].

Taking this situation into consideration the low level of production , Nigeria needs to rise beyond the level of subsistence to higher level of profitability through more efficient use of their production resources.

It is against this background that the study will embark upon with a view of providing answers to the following research questions. Is catfish production in the study area profitable? Are resource employed in catfish production efficiently utilized? What factors determine revenue in catfish production? Are there constraints associated with catfish production that could be faced by practicing perspective catfish farmer?

### **1.3 Review of related literature**

Number of studies reported on the economics of fish production around the world. just to mentioned a few. An assesment of the socio-economic analysis of fish farming in Oyo State, Nigeria was carried . A multistage random sampling technique was used to select 222 fish farmers from all the four agricultural zones in the state. The result of the budgetary analysis show that average total cost (TC) of N 2,883, 515.08 was incurred, total revenue (TR) of N 4,873,521.29 was realized and a returning gross margin (GM) of N 2,376,616.36. The profitability ratio gave a benefit-cost ratio of 1.69, rate of return of 0.69 gross revenue ratio (GRR) of 0.59 and expense structure ratio (ESR) of 0.15. This is an indication that fish farming is profitable in the study area.[14].

Similarly it was found that 80% of fish farmers in Oyo state, Nigeria, operated less than two (2) ha which could not capture economy of size, while more than 90% of the respondents distributed their fish at the site . 60% had little access to extension agents and finally, fish farming was found to be profitable in the study area [15].

In another study on the assesment of the economics of fish farming in Ibadan Metropolis, Nigeria. The study revealed that most farmers with secondary education and above operate at small-scale level with an average of three (3) ponds. Fish farmers practiced polyculture fish farming. *Clarias* spp is the most raised fish species followed by *Heteroclarias* spp. The gross margin analysis revealed that medium scale farmers derived the highest return of N1.55 for every one naira expended. This is followed by large-scale farmers at N 1.52 , thus for every 1 Naira compared with only N 1.34 for every 1 Naira spent by small-scale farmers. [16].

In another study carried out in Nigeria the cost of capture fisheries were higher than those of aquaculture except for the opportunity cost of family labour. Therefore, capture fisheries were more labour intensive than aquaculture. The inputted cost of family labour in aquaculture was about 63% lower than that of in capture fisheries. The result revealed that the short-term profitability of aquaculture is more promising than that of capture fisheries and that the gross revenue or value of fish output associated with aquaculture exceeded that of capture fisheries by about 35%. Further analysis also showed that the findings of the study showed that the net profit was negative in both systems, indicating that capture fisheries and aquaculture are not economically viable in the long-run as the returns being generated are not sufficient to cover the fixed cost of production.[17].

Similarly the economics of inland fishing, aquaculture and fish marketing in Niamey and Tillabery areas of Niger Republic was also analysed. The study showed that both the aquaculture and inland fish production were profitable with a rate of return of 61% and 320% respectively while two types of fish marketing channels were identified.[18]Also, [19] examines the economics of fish farming in Behera Governorate of

Egypt. They found out that, high prices of fish feed; declining fish prices and lack of finance were the top ranking serious constraints facing fish farmers in that area. Feed costs per kg of fish were LE 3.87, representing 58.9% of the production costs. The break-even analysis showed that average production costs of LE 6.57 per kilogram of fish while the sales price is LE 7.5 /kg. The findings also reveal that quantity of fish seeds is a notable and significant factor contributing to the fish farming enterprise in the study area.

A study on the economic analysis of fish farming in Calabar, Cross River State, Nigeria was also carried out, its objectives was to determined the factors affecting fish farming, estimated gross margin of fish farms and examined the costs and returns relationship of fish farming in the study area. The study utilized a two stage sampling technique to select 36 fish farms in Calabar. Fish farming in the study area is profitable as majority of the farmers made a gross margin of N400, 000- N700, 000 per annum. It was also discovered that the amount spent on stocking accounted for 37.27% of the running cost, followed by amount spent on water (30.21%), feeding (16.51%) and labour (14.84%). Multiple regression analysis was used to analyze the data. Cob-Douglas equation was chosen to be the lead equation because of statistical significance of the coefficient and high  $R^2$  value of 0.94. The result indicated that feed (kg), years of farming experience and stocking density have significant effect on output levels.[20]

#### **1.4. Objective of the Study**

The general objective of the study was to analyse the profitability of fish farming in Warri South Local Government Area of Delta State, Nigeria.

The specific objectives are to;

- (i) describe the socio-economic characteristics of the fish farmers in the study area;
- (ii) identify predominant types of fish pond structures and type of culturing systems;
- (iii) determine the costs and returns of fish farming in the area; and
- (iv) identify constraints affecting fish farming in the study area.

## **II. Methodology**

### **2.1 Area of the Study**

Warri South Local Government Area was created out of the old Warri Local Government Area in 1991, and has a total population of 303,417 comprising of 156,098 males and 147,319 females [21]. Bound to the north by Warri North and Sapele Local Government Areas, bounded to the South by Udu, Warri South West and Burutu Local Government Areas, and to East by Warri South West and to the West by Okpe Local Government Areas.

Warri South Local Government Area has witnessed political restructuring of its wards due to the need for economic emancipation and strategic planning for even development of the Local Government Area; presently there are a total of nineteen (19) wards. The people of Warri South Local Government Area are mainly the Itsekiris the Ijaws and the Urhobos'. They are very industrious people; they are business men and women, farmers, fishermen and professionals in various careers. They have similarities in culture e.g dressing, worships, food, festival and other ways of living [22].

### **2.2 Population of the Study**

The targeted population that was used for this study, comprised of all fish farmers who were into fish farming in Warri South Local Government Area, Delta State.

### **2.3 Sampling Techniques**

A purposive sampling technique was used to select five (5) fish farmers each from ten communities of Ogonu, Iyara, Okere-Urhobo, Ode-Itsekiri, Ekurede-Urhobo, EkuredeItsekiri, Ubeji, Ugbuwangwe, Merogun and Ifie-kporo in the study area to give a total sample size of 50 fish farmers. These communities were purposely selected because of the prevalence of fish farming in them.

### **2.4 Data Collection Method**

Well-structured questionnaire were administered to fifty (50) respondents which were used for primary data collection. The questionnaire were divided into four (4) sections; section "A" contained the socio-economic characteristics of fish farmers in the study area; section "B" covered the type of culturing system used; section "C" captured data on the costs and returns involved in fish farming while section "D" covered the constraints encountered by fish farmers in the study area.

### **2.5 Analytical Frame Work**

Various analytical tools were used to achieve the objectives of the study and they included: simple descriptive statistics such as frequency distributions, tables, percentages, gross margin (GM) and net farm income (NFI)

Gross margin is the difference between the gross farm income and the total variable cost [23].

Therefore;  $GM = GFI - TVC$ -----(1)

Where GM = Gross margin

GFI = Gross farm income

TVC = Total variable cost

The net farm income gives an overall level of profitability of an enterprise by putting both fixed and variable costs into consideration and subtracting the total costs from the total revenue.[23].

Therefore,  $NFI = TR - TC$ -----(2)

Where;

NFI =Net Farm Income, TR = Total revenue, TC = Total cost

### III. Results And Discussion

#### 3.1 socio-economics characteristics for the respondents.

Table 1 shows that majority (90%) of the respondents were males while 10% were females. The result portrays that men dominated the study population and were more involved in fish farming in the study area. The result also indicates that majority (40%) of the respondents fell within the age group of 30>40 years and 30% were within the age range of 41>50 years while 20% fell within the range of 51>60 years and 10% were below 30 years old. The result indicates that majority of the farmers were at their economic active age group. The result also shows that 60% of the respondents were married while 40% of the respondents were single.

**Table 1: Socio-Economic Characteristics of the Respondents. (N =50)**

Variable	Frequency	Percentage (%)
<b>Sex</b>		
Male	45	90
Female	5	10
<b>Age</b>		
Below 30 years	5	10
30 > 40 Years	20	40
41 > 50 years	15	30
51 > 60 years	10	20
Above 60 years		
<b>Marital Status</b>		
Single	20	40
Married	30	60
Divorced	-	-
<b>Educational Background</b>		
No Formal Education	5	10
Primary Education	15	30
Secondary Education	20	40
Tertiary Education	10	20
<b>Occupation</b>		
Fish farming only	20	40
Fish farming and other farming	30	60
Civil servant	-	-
<b>Type of Labour Used</b>		
Family labour	40	80
Hired labour	8	16
Both	2	4
Mono culture	38	76
Poly culture	10	20
Integrated	2	4
<b>Type of cultured species stocked</b>		
Clarias spp only	45	90
Clarias and Heterobranchus	4	8
Clarias and Tilapia	1	2
All three type of fish	-	-
<b>Pond Type</b>		
Concrete pond	15	30
Tarpaulin pond	30	60
Earthen pond	5	10
<b>Source of Finance</b>		
Personal savings	15	30
Friend/relatives	10	20
Co-operative societies	20	40
Bank loans	5	10

Source: Field Survey Data, 2014.

Majority (40%) of the respondents had secondary education, 30% had primary education while 20% had tertiary education while 10% had no formal education. This shows that fish farmers in the study area were educated and can combined scarce resources for efficient production. Majority (60%) of the respondents combined fish farming and other types of farming, 40% were into fish farming only and none were civil servants. The result indicates that majority of the respondents were mixed farmers.

From the findings, the result shows that majority (80%) of the respondents used family labour, 16% used hired labour while 04% used both sources of labour.

### 3.2 Identified Fish Culture System

Table 1 above shows that 76% of the respondents cultivated mono-culture species of fish, 20% of the respondents cultivated poly-culture while only 04% of the respondents practiced integrated system.

The result also shows that majority (90%) of the respondents cultured clarias fish only, 8% of the respondents cultured clarias and Tilapia, 2% of the respondent cultured clarias and heterobranchus while none of the respondents cultured all three types of species.

Majority (60%) of the respondents used Tarpaulin pond structure for culturing, 30% of the respondents used concrete pond structure while 10% of the respondents used earthen pond structure for culturing fish.

Regarding funds the findings indicates that majority (40%) of the respondents obtained their funds from co-operative societies, 30% of the respondents had their finance through personal savings, 20% from friends or relatives while 10% obtained loans from banks.

### 3.3 Costs and Returns on Fish Farming in the Study Area

The study examines the profitability of fish production in the study area. To determine the profit level, attempts were made to estimate the cost and return analysis from fish farming using input used, cost, yield or output data generated from the farmers. The cost and return analysis in Table 2, reveals that the variable cost accounted for the largest proportion (72.95%) of the total cost of fish farming in the study area. This shows that larger amount of money spent by fish farmer in the study area was mainly on purchase of fish feeds and fuels of which fish feeds accounted for 59.45% of the total cost of production.

**Table 2. Costs and Returns on analysis of the Respondents (n=50)**

Cost Items	Amount (₦)	% Total Cost
<b>Variable Cost</b>		
Fish Feed	325, 116	59.45
Fingerlings	20, 000	3.38
Organic Manure	770	0.13
Fuel	26, 192	4.42
Labour	9, 550	1.61
Water Treatment	3, 152	0.53
Transportation	20, 314	3.43
Average Variable Cost	432, 094	72.95
<b>Fixed Cost</b>		
Depreciation of Rent	20, 616	3.48
Pond Construction	78, 293	13.22
Water Pump	6, 500	1.10
Bore Hole Sinking	30, 000	5.06
Generator	18, 000	3.04
Plumbing Materials	1, 564	0.26
Wheelbarrow/Shovel/Head Pan	5, 249	0.89
<b>Total Fixed Cost</b>	<b>160, 222</b>	<b>27.05%</b>
<b>Total Cost</b>	<b>592, 316</b>	
<b>Total Revenue</b>	<b>976, 622</b>	
<b>Gross Margin</b>	<b>544, 528</b>	
<b>Net Farm Income</b>	<b>384, 306</b>	
Return on Investment	0.92	
Benefit/Cost Ratio	1.65	
Gross Revenue Ratio	0.61	
Fixed Ratio	0.16	
Operating Ratio	0.44	

**Source:** Field Survey Data, 2014.

This result is in agreement with the findings of [24] who found out that feed accounted for the highest cost of fish production in Kaduna State, Nigeria. The high cost of feed was followed by cost of fuel (4.42%), transportation (3.43%), and fingerlings (3.38%). The fixed cost of production accounted for (27.05%) of the total cost; of which the major components were pond construction (13.22%) bore hole sinking (5.06%) depreciation of rent (3.48%) and generator (3.04%). Also, the result shows that a total cost (TC) of ₦592, 316 was incurred by a respondent per cropping season while total revenue (TR) of ₦976,622 was realized with a

returning gross margin (GM) of N544,528 and a net farm income (NFI) of N384,306. This indicates that fish farming in the study area was profitable. This result was consistent with the finding of [25] who examined the profitability and viability of cat fish farming in Kogi State and found it to be profitable.

The Benefit Cost Ratio (BCR) was 1.65, this ratio is according to [26] are of the concept of discount method of project evaluation. According to them, as a rule of thumb, project with cost ratio greater than one, equal to one or less than one indicate profit, break-even or less respectively. Since the ratio of 1.65 is greater than one, enterprise is believed to be profitable. This result agrees with that of [26] which said that fish farming is profitable. Also, according to [14] the profitability ratio reveals that its benefit cost ratio is (1.69) . The finding in this study compares favourably with that of [24],they examined the profitability and viability of cat fish farming and found it to be profitable. The rate of returns in fish production in the study area is 0.69. This shows that for every N1.00 invested, 69kobo is gained by the respondent and a gross revenue ratio of 0.32 indicates that for every one naira return to fish farm enterprise, 32kobo is being spent. This also confirmed profitability.

The return on investment in fish farming in the study area was 0.92 which implies that for every naira invested, 92 kobo was gained by the respondent. Gross revenue ratio of 0.61 indicated that for every one naira return to fish farm enterprise, 61 kobo was spent. The value of operating ratio was 0.44 which implies that about 44% of the total cost of production was made up of fixed cost. This implies that the business is worthwhile since increase in the production with variable cost would increase the total revenue leaving the fixed cost unchanged.

### 3.4 Constraints Encountered by Fish Farmers

Fish farmers were confronted with a number of problems in fish farming enterprise in the study area:

**Table 4. Constraints Encountered by Fish Farmers in the Study Area.**

Constraints	Frequency	Percentage (%)
Land Acquisition	22	44
Poor performance of species of fish	21	42
High cost of fish feed	43	86
Disease and pest infestation	24	48
Insufficient capital	47	94
Market Price Fluctuation	30	60

Source: Field Survey Data, 2014.

Table 4, shows that the major constraints were insufficient capital (94%), lack of processing/preservation/storage facilities (92%), high cost of feed (86%), and market price fluctuation (60%). The minor constraints were disease and pest infestation (48%), land acquisition (44%), and poor performance of fish species (42%). The problem of insufficient capital was expected as most findings have shown that majority of small scale farmers in Nigeria depended solely on their personal savings to finance their production for lack of credit facilities,[27]. This is also corroborated by the findings of [24] who identified lack of finance as a major constraint of fish production in Kaduna State, Nigeria. Similarly 100percent of the respondents considered market price fluctuation and high cost of fish feed as a problem facing fish production in their study of the assessment of socio-economic analysis of fish farming in Oyo State, Nigeria.[14]. This result corroborate the findings of [24] ,their studies revealed that the major constraints affecting increased level of output fish production in the study area were high cost of inputs, lack of adequate finance, access to credit facilities, security and farm labour problems.

## IV. Conclusion And Recommendations

The study analysed the profitability of fish farming in Delta State, Nigeria. Gross Margin (GM) and Net Farm Income (NFI) were employed for the analysis. The empirical results showed that the GM and NFI were N544,528 and N384,306 respectively were obtained from the study. The rate of returns on fish farming was 0.92. This indicates that for every N1.00 invested, 92 kobo was gained by the respondent and an operating ratio of 0.44, fixed ratio of 0.16 and gross ratio of 0.61 which was positive and less than one, which implies that fish farming was highly profitable in the study area.

The study therefore recommended the followings:

Insufficient capital ranked highest among the constraints encountered by fish farmers in the study area. This calls for urgent attention of the government to establish organised financial institutions to offer financial services to this group of farmers in well publicized manners, easily accessible and at affordable interest rate.

The high cost of fish feed has been corroborated by previous findings of divers study on fish farming and production. This constraint could be addressed by the farmers forming a formidable group of cooperative societies with aids from non-governmental organisations and other organised private sectors to establish fish feed mill for quality feed at affordable price.

The cost of pond construction was another great limitation which the government could intervene by training more extension agents on sourcing least cost pond construction materials and also to acquire competence and skill in the construction of ponds.

Lack of processing/preservation/storage facilities was a very serious challenge in that fish is a highly perishable food item that can lead to colossal economic loss if not processed, preserved and stored within limited time frame. Due to high cost of fuelling cold storage facilities, it is recommended that the government should establish cold rooms in strategic locations for farmers to obtain services and pay for such services; that is pay according to services programme.

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