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Assessment of Socio-Economic Analysis of Fish Farming in Oyo State, Nigeria

By Olaoye, O. J, Ashley-Dejo, S. S, Fakoya, E. O, Ikeweinwe, N. B, Alegbeleye, W. O, Ashaolu, F.O & Adelaja, O. A

Federal University of Agriculture, Abeokuta

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I. Introduction

Fish farming is the fastest-growing animal based food production sector, particularly in the developing countries – mainly from China and other Asian countries (Green facts, 2004). In Africa, the governments of the continent under the tutelage of the African Union, have identified the great potential of fish farming and are determined to encourage private sector investment (NEPAD, 2005). The potential exists for fish farming to make a difference as shown by pilot projects, although these pilot projects fail when they are scaled up (New Agriculturists, 2005). In Africa, the fish sector provides income for over 10 million people engaged in fish production, processing and trade (New Partnership for African Development, 2005). Fish has also become a leading export commodity for Africa with an annual export value of $2.7 billion (U.S.). Yet these benefits are at risk as the exploitation of natural fish stocks is reaching its limits (Mutume, 2002). Although there is a paucity of information on the status of the fisheries industry and the role it plays, it is estimated that Africa produced 7.3 million tonns in 2003, and 4.8 million tonns was from marine fisheries (FAO, 2005). 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 tonns in 2004 (FAO, 2007). Prior to the 1990s, aquaculture development in Nigeria was driven by socio-economic objectives including, nutrition improvement of rural communities, generation of additional family income, creation of employment and diversification of income generating activities; and was promoted by International Organizations and agencies and the government at Federal, State and Local Government levels.

Nigeria has over 14 million hectares of inland water surface, out of which about 1.75 million are available and suitable for aquaculture (FAO, 2006). In Nigeria, aquaculture is predominantly an extensive land based system, practiced at subsistence levels in fresh waters (Anyawu-Akeredolu, 2005). Commercial farming has yet to become widespread (Fagbenro, 2005). At present, most fish farmers operate small-scale farms ranging from homestead concrete ponds (25 - 40 meters) to small earthen ponds (0.02 - 0.2 hectares). The industry produced over 85,000 tonns of fish in 2007 (FDF, 2008).

According to Akegbejo-Samsons (1997) while human population with growth is rising at a rate of about 4 - 5% and livestock production is rising at a rate of 2 – 3%. This shows that there is wide gap between supply and demand of animal protein. The consequence of the sceneries is the soaring cost of animal protein. This has made it almost impossible for the poverty stricken Nigerian to meet their animal protein needs.

Despite the abundance fisheries resources and the relatively high consumption of fish in Nigeria that is the largest simple consumer of fish products in Africa (FDF, 2005; 2008), its domestic output of 0.62 million metric tonns still falls short of demand of 2.66 million metric tonns (FDF, 2008). A supply of deficit of 2.04 million metric tonns is required to meet the ever increasing demand for fish in Nigeria. This large deficit between the demand and supply of fish is augmented by massive importation of frozen fish and consequently

Authors σ ω ¥ χ : Department of Aquaculture and Fisheries Management, Federal University of Agriculture, Abeokuta.
E-mail : adeolu247@yahoo.com
Author α : Agricultural Media Resources and Extension Centre, Federal University of Agriculture, Abeokuta.
Author ρ : Departmnet of Agricultural Extension and Rural Development, Federal University of Agriculture, Abeokuta.
Author § : Departmnet of Agricultural Economics and Farm Management, Federal University of Agriculture, Abeokuta.

effect on the exchange earnings of the national economy as well as caput consumption 9.68kg/ head/year (FDF, 2008). The species imported are mainly herring, mackerel and stock-fish to offset the deficit of 2.04 million metric tonns. Quantity of fish imported rose from 557,884.00 tonns to 739,666.12 tonns between 2000 and 2007. The amount of foreign exchange on fish importation also rose from US$ 241,066.54 million in 2000 to US$ 594,373.69 million in 2007. Nigeria is a large importer of fish with official records indicating 681,000 metric tonns while export in 2008 was 0.065 million metric tonns and valued at US$40.5 million. The local supply consists of productions from the artisanal (89.5% - 85.5%), industrial (5% - 2.5%), and aquaculture (5.5% - 12.0%) sub-sectors (FDF, 2009). However, it has been shown that Nigeria can substitutes fish importation with domestic production to create jobs, reduce poverty in rural and peri-urban areas where 70% of the population live and ease the balance of payment deficits (Areola, 2007; FDF, 2005, 2009; Olaoye, 2010).

According to FAO (2006), fish supply in Nigeria is 400, 000 tonns in comparison to 800, 000 tonns of demand hence there is need to close the gap between fish demand and fish supply in the country including Oyo State. However, the following research questions need to be addressed;

1) What are the socio-economic characteristics of the fish farmers in the Study area?
2) What are the types of fish farming practices and characteristics in the study area?
3) What are the constraints of fish farming in the study area?
4) What are the costs and returns of fish farming in the study area?
5) Is fish farming profitable in the study area?

II. Objectives of The Study

The broad objective of this study is to carry out socio-economic analysis of fish farming in Oyo State Nigeria. The specific objectives are to:

1) describe the socio-economic characteristics of fish farmers in the study area.
2) identify the types of fish farming Practices and characteristics in the study area
3) identify the production constraints affecting aquaculture development in the study area.
4) determine the costs and returns of fish farming in Oyo State.
5) determine the profitability ratio of fish farming in the study area.

a) Research Hypothesis

The following null hypothesis has been formulated for this study;

Ho_1: Fish farming is not profitable in Oyo State.

III. Methodology

a) The Study Area

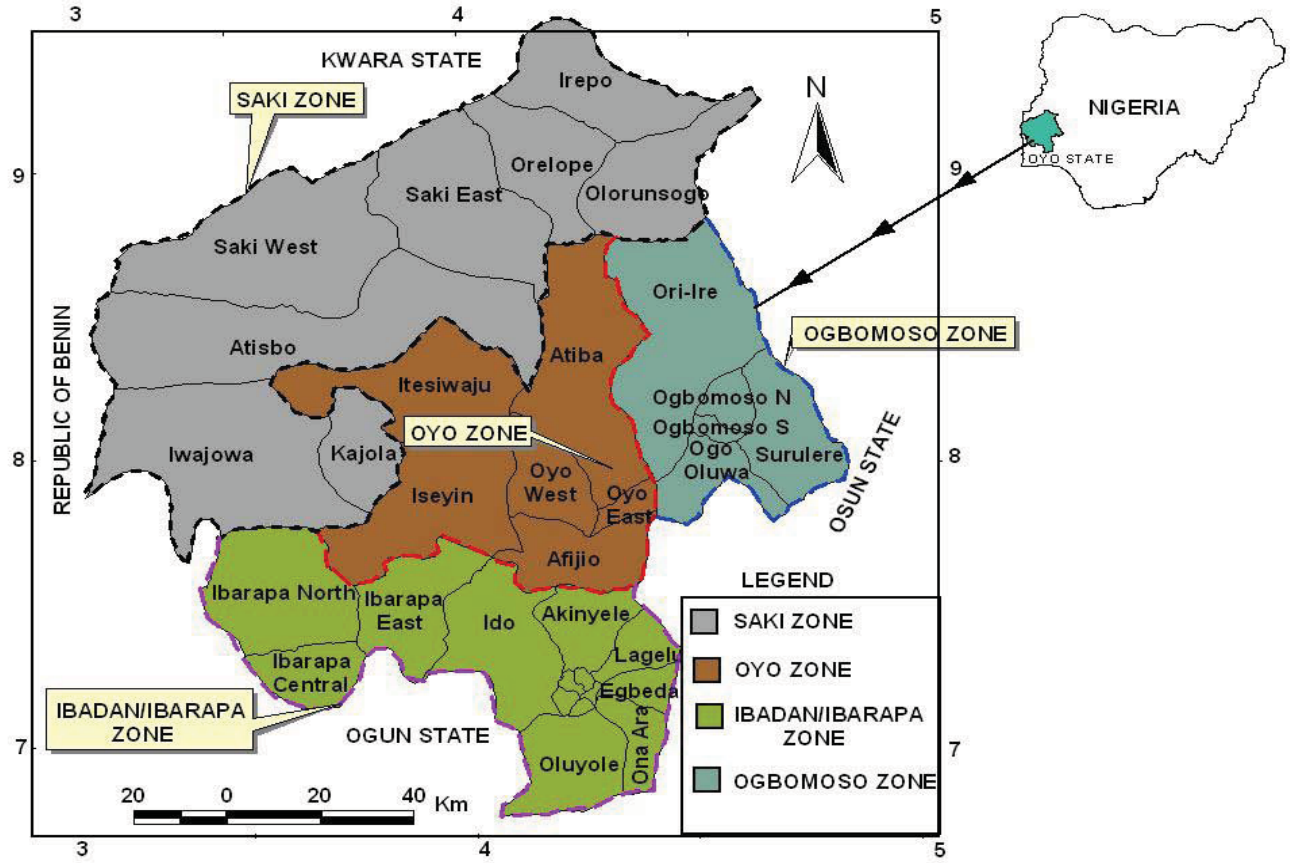
The study was conducted in Oyo State South - West Nigeria. Oyo State is one of the thirty-six states of the Federal Republic of Nigeria. It came into existence with the break-up of the old Western State of Nigeria during the state creation exercise of 1976. Ibadan, the capital which is reputed to be the largest indigenous city in Africa, South of the Shara, had been the centre of administration of the old Western Region since the days of the British colonial rule in Nigeria.

The state has an estimated population of over 5,591,589 million people (N.P.C, 2006). The state is located in the rainforest vegetation belt of Nigeria within longitude $7^0 23' 47''$N and $3^0 55' 0''$. It is bounded in the south by Ogun State and in the north by Kwara State, in the west by the Republic of Benin while in the east it is bounded by Osun State (Figure 1). Oyo state exhibits the typical tropical climate of averagely high temperatures, high relative humidity and generally two rainfall maxima regimes during the rainfall period of March to October. Oyo State now consists of thirty three Local Governments and the capital of the state is Ibadan. The main occupations of the people in the state are: Agriculture which is the mainstay of the economy of the State. The tropical nature of the climate favours the growth of variety of food and cash crops are yam, maize, cassava, millet, plantain, banana, rice and fishing.

It is concerted efforts to revitalize agriculture in the state and thereby boost food production, the State Government has established the sate-wide Oyo State Agricultural Development Programme (OYSADEP), which is an offshoot of the defunct Oyo North Agricultural Development Project (ONADEP).According to OYSADEP, Oyo State was divided into four Agricultural extension zones namely: Ibadan/Ibarapa, Ogbomoso, Oyo and Saki.

b) Sampling Procedure and Sample Size

Multi-stage random sampling technique was used for the selection of two hundred and twenty two (222) fish farmers throughout the four extensional zones. In stage 1, 60% extensional blocks from each of the four zones to give a total of 16 blocks were purposively selected for the study. In stage 2, from each of the selected extensional blocks 60% were also randomly selected to give a total of 79 circles in all the selected blocks. In stage 3, from each circle, 60% fish farmers were selected using simple randomly sampling techniques to give a total of 222 fish farmers. Thus a total number of two hundred and twenty (222) fish farmers were selected throughout the four extensional zones.



Source : Field Survey, 2011

Figure 1 : Oyo State ADP Zones & Blocks showing study location

c) Data Collection Instruments

A well structured interview schedule was administered to two hundred and twenty two (222) respondents which were used for primary data collection. The interview schedules were divided into four (4) sections: A, contains socio-economic characteristics of fish farmers in the study area, B, contains the types of fish farming practices and characteristics, C, contains the costs and returns involved in fish farming in the study area and D, contains the constraints'/problems of fish farming in the study area.

d) Data Analysis Techniques

Various analytical tools were used to achieve the objectives of the study and they include: simple descriptive statistics such as frequency distribution tables, percentages, averages (mean), net farm income (NFI), gross margin (GM) and profitability ratios.

i. *Gross Margin (GM)*

Gross margin is the difference between the gross farm income and the total variable cost (Olukosi and Erhabor, 1989).

Therefore; GM = GFI – TVC

Where GM = Gross margin

GFI = Gross farm income

TVC = Total variable cost

ii. *Net Farm Income (NFI)*

According to Olukosi and Erhabor (1989), net farm income gives an overall level of profitability of an enterprise by putting both fixed and variable costs into consideration and subtracting the cost from the total revenue.

Therefore; NFI = TR - TC

Where TR = Total Revenue

TC = Total cost.

iii. *Profitability Ratios*

Profitability ratio is a class of financial metrics that helps investors assess a business's ability to generate earning compared with its expenses and other relevant costs incurred during a specific period.

When these ratios are higher than a competitor's ratio or than the company's ratio from a previous period, this is a sign that the company is doing well (Okwn and Acheneje, 2011). Some examples of profitability ratios are listed and explained below:

iv. *Benefit Cost Ratio BCR)*

Benefit cost ratio or analysis is the term that either refers to helping to appraise, or assess the case for a project programme or policy proposal and an approach to making economy decision of any kind. From the above definition, the process involves whether explicitly or implicitly weighing the total expected costs

against the total expected benefits of one or more actions in order to choose the best or most profitable option.

Therefore; BCR = TR/TC

Where TR = Total Revenue

TC = Total cost

Expense structure ratio (ESR) = FC/VC

Where, FC = Fixed cost and VC = Variable cost

Rate of return (ROR) = NR/TC

Where, NR = Net Return

Gross Revenue Ratio (GRR) = TFE/GI

Where, TFE = Total farm expenses and

GI = Gross income.

IV. Results and Discussion

a) *Socio-economic characteristics of small scale fish farmers from Oyo State*

Table 1 shows the distribution of fish farmers with respect to their socio economic characteristic. Most (49.1%) of the fish farmers fall within the age bracket of 41 – 50 years, 37.8 percent fall within 31 – 40 years, 8.1 percent were above 50 years of age while 2.0 percent fell within the age range of 21 – 30 years. This age bracket is a productive age which portends better future for catfish production also it is considered as economically active age (Olowosegun *et al.,* 2004). This indicates that very few young and old people are involved in fish farming. This is because fish farming requires adequate attention and a lot of sense of responsibility.

Sex plays a very important role in fish farming and agriculture, in terms of property acquisition, for example, fixed assets like land and machines. Majority (84.2%) of the fish farmers were male while 15.8 percent were female. This result can be justified by the assertion of Brummett *et al.,* (2010) that fisheries activities are mostly dominated by men. Ekong, 2003 pointed out that marriage in our society is highly cherished. This ascertain was further confirmed by the report of Fakoya (2000) and Oladoja *et al.,* (2008) who assert that marriage confer some level of responsibility and commitment on individual who are married. In this study, it was discovered that majority of the farmers were married (46.1%) while very few were single, widowed and separated. Respondents without formal education were 3.2 percent while 87.3 percent had tertiary education. This means that fish farming is dominated by the educated class and mostly by those armed with high level of education. This is so because fish farming requires a lot of technical and scientific knowledge to be successfully undertake. Majority (58.1%) spent above 15 years in school, 23.0 percent spent between 11 – 15 years while 14.4 percent spent. It was found that, majority (53.2%) of the fish farmers were Christians, 43.2 percent of them practiced Islam while 3.6 percent were traditional worshippers. The mean household size was found to be 9 people per household. This was an indication that the more educated and urban-based an individual is, the less family-size that individual will keep (Yarhere, 2004). Based on farmer's response during field survey, it was discovered that some of the respondents engaged in other occupation apart from fish farming. Occupation remains valid in our society as people have one or two things they engaged in which gives them sense of satisfaction and belonging in the society. Assessing the occupational status of the respondent, majority (63.1%) of the fish farmers engaged more in other farming actives part from fish farming than any other occupation. It revealed that 40.5 percent had fish farming experience ranging between 11 – 15 years, 35.6 percent had between 5 – 10 years, and 15.8 percent had less than 5 years while 8.1 percent had above 15 years experience in fish farming. As a result, the respondents with the highest number of years of experience should have good skill and better approaches to fish farming business. The respondents with longer years of experience were also able to forecast market situation in which they sell their products at higher prices. Those with less years of experience, especially with less than 5 years faced many risks in the early days of their fish farming business. Majority (67.6%) of the respondents purchased the land they are using for fish farming, 23.0% rented the land, while 7.7% and 1.8% got the land through inheritance and gift respectively.

Table 1 : Percentage distribution of the socio-economic characteristics of small scale fish farmers in Oyo states (N = 222)

VARIABLES	FISH FARMERS			
	Frequency	Percentage (%)	Mean($\overline{X}$) / Mode	Std
Age (years)				
Bellow 20	0.0	0.0		
21-30	11	5.0		
31-40	84	37.8		
41-50	109	49.1		

Above 50	18	8.1		
Total	**222**	**100.0**	**46**	**0.709**
Sex				
Male	187	84.2		
Female	35	15.8		
Total	**222**	**100.0**	**Male**	**0.365**
Marital Status				
Single	25	11.3		
Married	169	76.1		
Widowed	20	9.0		
Separated	8	3.6		
Total	**222**	**100.0**	**Married**	**0.588**
Educational status				
No formal Education	7	3.2		
Adult Education	0	0.0		
Primary Education	44	19.8		
Secondary Education	62	27.9		
Tertiary Education	88	39.6		
Others	21	9.5		
Total	**222**	**100.0**	**Tertiary**	**0.670**
Number of years spend in school				
1 – 5	10	4.5		
6 – 10	32	14.4		
11 – 15	51	23.0		
Above 15	129	58.1		
Total	**222**	**100.0**	**16**	**0.866**
Religion				
Christianity	118	53.2		
Islam	96	43.2		
Traditional	8	3.6		
Total	**222**	**100.0**	**Christianity**	**0.569**
House Hold Size (Persons)				
1 – 3	35	15.8		
4 – 7	152	68.5		
8 – 11	35	15.8		
Total	**222**	**100.0**	**6**	**0.563**
Other Occupation that Generate Income apart from Fish Farming				
Farming	140	63.1		
Civil service	40	18.0		
Trading	20	9.0		
Vocational job	22	9.9		
Total	**222**	**100.0**	**Farming**	**0.670**
Fish Farming Experience (Years)				
Less than 5	35	15.8		
5 – 10	79	35.6		
11 – 15	90	40.5		
Above 15	18	8.1		
Total	**222**	**100.0**	**9.3**	**0.850**
Mode of Land Acquisition				
Purchase	150	67.6		
Lease/Rent	51	23.0		
Inheritance	17	7.7		
Gift	4	1.8		
Total	**222**	**100.0**	**Purchase**	**0.865**

Source : Field Survey, 2011.

b) Fish Farming Practices and characteristics by the Fish Farmers

Table 2 reveals that most (89.2%) of the fish farmers went into fish farming in other to make profit while (8.6 % and 2.3%) went into fish farming to augment income and for household consumption respectively. Source and quantity of water available are one of the most important factors to be considered when selecting a site for aquaculture practice. The quantity of water needed for commercial aquaculture varies with the production method employed, type of aquaculture chosen, scale of operation, and species cultured. Most (61.7%) of the respondents depend directly on either stream or river as their major source of water, 25.2 percent depend on deep well as source of water, while 13.1 percent depend on borehole. This may be due to the fact that Oyo State has rivers located within the geographical area of the state. In terms of holding/rearing structure, majority (44.1%) of the respondents used both concrete and earthen ponds, 27.5 percent of the respondents used concrete pond only, 26.1 percent of the respondents used earthen pond only, while 2.3 percent used fish trough/ holding/rearing structure. Fish farmer in the study area preferred monoculture to polyculture system. This may be as a result of poor market price for tilapia. Majority (66.7%) of fish farmers adopt monoculture of African Catfish (*Clarias gariepinus*). This was also supported by Rundquist (1984) who observed that fishes grow better when cultured individually under monoculture system and also help the specie to grow to its biggest size. Based on the types of species cultured, majority (73.9%) of the fish farmers in the study area culture mainly *Clarias spp.* under the influence of high market price, greater demand preferences, hardiness of the stock, fast growth, high feed conversion ratio high survival rate under captivity. This may be due to the fact that cat fish appears to be hardy and generally accepted by people. Majority (63.1%) of the respondents get their fish seed from owned fish farms. This is an indication that they are well trained and they have acquired needed information to operate a personal fish hatchery, while 28.4 percent source fish seed from other fish hatcheries and (8.6%) minority depend on governments' farms for fish seeds. The fact is that the fingerlings sourced from fish farms are more likely to be healthier and well breed.

Based on culturing period (production of table size), more than half of the respondents (57.7%) cultured their fish for five months, 22.1 percent cultured for six months, 14.4 percent cultured for four months, while a very low percentage (13.0%) cultured their fish for more than six months. Furthermore, majority (86.9%) of the respondent harvest twice a year, while 7.2 percent and 5.9 percent do harvest once and thrice respectively. The choice of culture period is usually influenced by factors such as timing towards festive period or due to the lack of feeds as explained by Okoye and Omorinkoba (1994).

Cooperative society is a social participation that helps farmers to pool their resources in order to have access to fisheries inputs and to have insights in their fishing issues. Membership of cooperatives is also a factor that influences the adoption of improved fisheries technologies and poverty alleviation. This shows that majority (62.6%) of the respondents in the study areas were members of cooperative societies while others do not belong to any registered or unregistered society which may be as a result of lack of awareness and interest. Hence, being a member of association group could create peer pressure for farmers to adopt new technologies. This was in line with Akinbile, (1998) who observed that groups ensure that members derive benefits from the groups in which they cannot derive individually if they were acting alone. More than one quarter of the farmers did not have group status so they operated as ordinary members and this may have effect on their access to credit facilities and adoption of technologies, as it is easier to pass information to a group than individual farmers. The status of fishers' group had significant differences between the study areas.

Table 2 : Fish Farming Practices and characteristics by the Fish Farmers (N = 222)

VARIABLES	FISH FARMERS Frequency	Percentage (%)	Mean($\overline{X}$) / Mode	Std
Reason for going into Fish Farming				
To make profit	198	89.2		
To argument income	19	8.6		
For house hold consumption	5	2.3		
Total	**222**	**100.0**	**Profit**	**0.399**
Source of Water				
Stream/river	137	61.7		
Borehole	56	25.2		
Deep well	29	13.1		

Total	**222**	**100.0**	**Stream/river**	**0.716**
Rearing Structure/Facilities				
Earthen pond and concrete tank	98	44.1		
Concrete pond only	61	27.5		
Earthen pond only	58	26.1		
Fish trough	5	2.3		
Total	**222**	**100.0**	**Earthen pond and concrete tank**	**1.281**
Types of culture				
Monoculture	148	66.7		
Polyculture	53	23.9		
Integrated	21	9.5		
Total	**222**	**100.0**	**Monoculture**	**0.560**
Types of Cultured Specie				
Clarias spp	164	73.9		
Clarias and *Tilapia spp*	47	21.1		
Heterobranchus spp	11	5.0		
Total	**222**	**100.0**	***Clarias spp***	**0.813**
Source of Fingerlings				
Own fish farm	140	63.1		
Fish hatchery	63	28.4		
Government fish farm	19	8.6		
Total	**222**	**100.0**	**Own fish farm**	**0.576**
Culturing Period				
Four months	32	14.4		
Five months	128	57.7		
Six months	49	22.1		
More than six months	13	5.9		
Total	**222**	**100.0**	**Six months**	**0.751**
Harvesting Period (Year)				
Once	16	7.2		
Twice	193	86.9		
Thrice	13	5.9		
Total	**222**	**100.0**	**Twice**	**0.362**
Cooperative Society				
Yes	139	62.6		
No	83	37.4		
Total	**222**	**100.0**	**Yes**	**0.484**
Source of finance				
Personal savings	106	47.8		
Friends/Relatives	22	9.9		
Cooperatives society	55	24.8		
Bank loan	39	17.6		
Total	**222**	**100.0**	**Personal savings**	**0.461**

Source : Field Survey, 2011

c) Cost and Return of Fish Farming in the Study Area

Estimate of cost and return analysis were made from fish farming using average cost (Fixed and Variable) and yield data generated by each of the sampled fish farmers per cropping season. The cost and return analysis in table 3, reveals that the variable cost accounted for the largest proportion (86.68%) of the total cost of fish farming in the study area. This shows that large amount of money spend by fish farmers in the study area was majorly for purchase of fish feeds and fingerlings. This finding is in agreement with Louise (1977) who said that the cost of feeds was very high in catfish production. This is followed by cost of fingerlings. The fixed cost of production consists of

cost of land purchase/rent, water pump, concrete tanks, earthen pond, deep well, generator building/shed, drag net, wheel barrow etc which accounted for 13.40% of the total cost. Also, the result shows that an average total cost (TC) of ₦ 2,883, 515.08 was incurred by a respondent per cropping season while total revenue (TR) of ₦ 4,873,521.29 was realized with a returning gross margin (GM) of ₦ 2,376,616.36 and a net farm income (NFI) of ₦ 1,990,006.21. This indicates that fish farming in the study area was profitable. This result is consistent with the finding of Ashaolu *et al.*(2006) who observed that fish farming is profitable and also confirmed in table 4 (Profitability ratio).

Table 3 : Economic analysis of the respondents (N = 222)

ITEMS	Amount (₦)	% Total Cost
VARIABLE COST		
Fish Feed	2,158,456.01	74.86
Fish seed	211,801.59	7.43
Lime/Fertilizer	3,473.18	0.12
Labour	69,296.88	2.40
Fuel	21,314.19	0.74
Transportation	17,351.08	0.60
Others	15,212.00	0.53
TOTAL VARIABLE COST	2,496,904.93	86.68
FIXED COST		
Land purchase/rent	18,616.43	0.65
Water pump	9,293.85	0.32
Concrete tanks	78,154.59	2.71
Deep well	21,570.00	0.75
Earthen pond	26,514.11	0.92
Plumbing materials	3,010.45	0.10
Building/Shed	167,856.00	5.82
Generator	45,761.00	1.59
Drag net, Weighing Scale/Cutlass/	10,694.62	0.37
Wheel barrow/ Shovel/ Head pan/ Bowls	5,139.10	0.18
TOTAL FIXED COST	386,610.15	13.40
TOTAL COST	2,883,515.08	
TOTAL REVENUE	4,873,521.29	
GROSS MARGIN	2,376,616.36	
NET FARM INCOME	1,990,006.21	

Source : Field survey, 2011

d) Profitability and Viability Estimate of Fish Farming in the Study Area

The analysis of ratios in table 4 reveals that the Benefit cost ratio (BCR) was greater than one. This ratio is one of the concepts of discount method of project evaluation. As a rule of thumb, any business with benefit cost ratio greater than one, equal to one or less than one indicate profit, break-even or loss respectively (Olagunju *et al.,* 2007). It is also in agreement with the work of Emokaro and Ekunwe (2009) who examined the efficiency of resource-use among catfish farmers to be viable. Since the ratio (BCR = 1.69) it implies that fish farming in Oyo state is profitable. It is therefore much possible to have higher value of BCR with increase in capitals and skilled labour.

i. *Rate of Return (ROR)*

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.

ii. *Gross Revenue Ratio (GRR)*

Gross revenue ratio of 0.59 indicates that for every one naira return to fish farm enterprise, 59kobo is being spent.

iii. *Expense Structure Ratio (ESR)*

The value of the ratio is 0.15 which implies that about 15% of the total cost of production is made up of fixed cost component. This make the business worthwhile since increase in the production with variable cost will increase the total revenue leaving the fixed cost unchanged.

Table 4 : Profitability Ratios

RATIOS	VALUES
Benefit Cost Ratio (BCR)	1.69
Rate Of Return (ROR)	0.69
Expense structure ratio (ESR)	0.15
Gross Revenue Ration (GRR)	0.59
Net Profit Margin (NPM)	0.41

Source : Field survey, 2011

e) Aquaculture production constraints Oyo State

Information on aquaculture production constraints was elicited and presented in table 5. Various factors which affect fish farming in the study area were rated according to the degree of severity. Majority of the fish farmers (58.6%) claimed that land accusation is not a problem facing aquaculture development in Oyo state thus 40.5 percent claimed that is a serious problem. Most (57.2%) of the respondents claimed that insufficient labour is a problem while 42.8 percent claimed that is not a problem. 49.5 percent claimed that distance of the extension staff's office to the village/farm is not a constrain militating against aquaculture development but 41.5% claimed that is a serious problem. Preservation and processing facilities is considered to be a constraint affecting aquaculture production by most (75.2%) of the respondents. Majority of the respondents (74.3% and 63.5%) does not consider absence of strong co-operative society and lack of finance (capital and credit) as major challenges affecting aquaculture production in the study area but majority of the fish farmers (90.1%) claimed that non-availability/high cost of quality fish seed is factor militating against aquaculture development in Oyo State. Likewise, majority of the fish farmers (94.6% and 96.0%) also claimed that poaching/predators and high cost/lack of construction equipment respectively were one of the major challenges facing aquaculture development in the study area. It was also show that all (100%) of the respondents considered market price fluctuation and high cost of fish feed as a problem facing fish production. Some other factors militating aquaculture production include; water shortage during dry season (92.3%), diseases and pest infestation (32.4%) and lack of technical know-how (42.4%).

Table 5 : Percentage distribution of the fish farmers by aquaculture production constraints (N = 222)

PROBLEMS	SEVERITY			
	Very serious Freq (%)	Serious Freq (%)	Not a problem Freq (%)	I don't know Freq (%)
Land accusation	18 (8.1)	72 (32.4)	130 (58.6)	2 (0.9)
Insufficient labour	48 (21.6)	79 (35.6)	95 (42.8)	0 (0.0)
Distance of the extension staff's office to the village/farm.	39 (17.6)	53 (23.9)	110 (49.5)	20 (9.0)
Preservation/Storage/Processing Facilities	71 (32.0)	96 (43.2)	40 (18.0)	15 (6.8)
Inadequate Motivation from extension officer	31 (14.0)	49 (22.1)	69 (31.1)	73 (32.9)
Absence of strong co-operative society	0 (0.0)	47 (21.2)	165 (74.3)	10 (4.5)
Lack of finance (capital and credit)	12 (5.4)	34 (15.3)	141 (63.5)	35 (15.8)
Non-availability/High cost of quality fish seed	152 (68.5)	48 (21.6)	22 (9.9)	0 (0.0)
Poaching/predators	40 (18.0)	170 (76.6)	12 (5.4)	0 (0.0)
High cost/lack of construction equipment	91 (41.0)	122 (55.0)	9 (4.1)	0 (0.0)
Market price fluctuation	167 (75.2)	55 (24.8)	0 (0.0)	0 (0.0)
High cost of fish feed	200 (90.1)	22 (9.9)	0 (0.0)	0 (0.0)
Water shortage during dry season	31 (14.0)	174 (78.4)	0 (0.0)	17 (7.7)
Disease and pest infestation	8 (3.6)	64 (28.8)	150 (67.6)	0 (0.0)
Lack of technical know-how	41 (18.5)	53 (23.9)	128 (57.7)	0 (0.0)

Source : Field Survey, 2011

f) Profitability of Fish Farming in the Study Area

The null hypothesis which stated that fish farming was not profitable in Oyo State is rejected while the alternative hypothesis (fish farming is profitable in Oyo State) is accepted. From table 3 and 4 an average total cost (TC) of ₦ 2,883,515.08 was incurred by a respondent per cropping season while total revenue (TR) of ₦ 4,873,521.29 was realized with returning gross

revenue (GR) of ₦ 2,376,616.36 and a net farm income (NFI) of ₦ 1,990,006.21. This indicates that fish farming in Oyo State was profitable.

This result agrees with that of Ashaolu *et al.* (2006) which said that fish farming is profitable. Also, the profitability ratio in table 4 reveals that the benefit cost ratio (1.69) is above one emphasizing the profitability of fish farming in the State. The finding in this study compares favourably with that of Emokaro and Ekunwe (2009) who 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 result is corroborate with the work Emokaro and Ekunwe (2010) who examined the profitability and viability of catfish farming in Kogi state, Nigeria.

V. Conclusions and Policy Implication

These study asses the socio-economic analysis of fish farming in Oyo State, Nigeria. Economic analysis and profitability ration was employed for this analysis. The empirical results show that, an average GR and NFI was N 2,376,616.36 and N 1,990,006.21 respectively, was obtained from the study. 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.

Based on this, we draw the following conclusions from the study: first, aquaculture production is a profitable investment considering the size GR obtained from the study. Secondly, the farms were fairly efficient in use of their resources considering the size of technical efficiency obtained. Thirdly, it is evident that fish farming is capable of creating employment, augmenting income and improving the standard of living of the people. However, feeds were found to be the major factor (input) affecting the output of fish farming in the study area. Lastly, significant level of profit observed among the farms is synonymous to improve efficiency environment among the farms from the study.

This study, therefore, suggests that policy variables such as extension, education, and credit identified in the study as important determinants of technical efficiency of the farms should strengthen as variable of policy concern for sustainable fish production in the Sate and Nigeria at large.

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