



PROFITABILITY AND VIABILITY OF FISH FARMING ENTERPRISES USING GOVERNMENT CREDIT AGENCY LOAN IN OGUN STATE OF NIGERIA

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ABSTRACT

In spite of the potential of aquaculture, there are lots of problems militating against its development in Nigeria. The major constraint to increased fish production in Nigeria is poor rate of capital formation and lack of credit facilities among others. Robust economic growth cannot be achieved without putting in place well focused programmes to reduce poverty through empowering the people by increasing their access to factors of production, especially credit. Governments in both developed and developing countries attempt to overcome these problems by subsidizing credit, setting up credit guarantee fund schemes and specialized agricultural credit bank and stimulating institutional innovations in the financial system. Sixty beneficiaries of the Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB) loan were randomly selected from Agricultural extension zones in Ogun State. Structured interview guides and face to face interview were used to elicit information from the respondents. The data collected were analyzed using descriptive statistics and profitability ratio. The cost and return analysis indicated that, total variable cost was ₦1,396,617.63, while the total revenue was ₦3,446,467.00, which gives a net farm income of ₦430,236.88. The profitability ratio gives a benefit cost ratio of 1.14. This indicates profitability of small scale fish farming in the study area. The regression analysis showed that the best fitted model is the double log function which recorded a coefficient of determination (R^2) of 0.39. Constraints hindering fish farming in the study area include high cost of feeding, poor marketing channel and inadequate capital. It is recommended that farmers should group themselves together as cooperators so as to have access to credits and inputs at cost.

Keywords: South Western Nigeria, net farm income, bank lending incentives

INTRODUCTION

Aquaculture, the farming of aquatic organisms in controlled environment 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 tonnes in 2004 (FAO, 2005).

To meet the demands for fish from the world growing population and to ensure food security, it is now necessary to increase fisheries productions, through aquaculture, since production from captures sources is already fully exploited and unlikely to expand further. Aquaculture contributes more than 16 million tonnes of fish and shell fish annually to the world food supply and it is one of the fast growing sectors of food production (FAO, 2004).

Aquaculture contributed 16,619 metric tonnes (4.5%) in 1995 and 85.087 metric tonnes (13.5%) in 2007 to domestic production in Nigeria (FDF, 2008). In the year 2009, Nigeria's projected population and

fish demand would be 153.9 million and 2.92 million tonnes (FDF, 2008).

Poor people are facing new barriers in both their production and returns on fish. Even by the standards of developing countries, artisanal fishers and fish workers are often among the poorest people and they generally operate on a small scale and use traditional fishing practices yet new technologies and environment requirement favour large scale capital intensive operation at the expense of traditional and small scale commercial fishing (Delgado *et al.*, 2003)

One of the reasons for the decline in the contributions of fisheries to the economy is lack of a formal national credit policy and paucity of credit institutions, which can assist farmers. Only a few financial institutions provide some credit without collateral for "small" loans. Small-scale fisheries are often considered too risky hence most banks do not include them in their credit loan scheme (Clark *et al.*, 2005). Credit (capital) is viewed as more than just another resource such as labour, land, equipment and

raw materials (Rahji, 2000). According to Shepherd (1979) credit determines access to all of the resources on which farmers depend. Granting credit to peasant farmers for the cost they incurred on land preparation, weeding and harvesting operations and labour to increase the use of agricultural inputs will enable them to be able to adopt modern farming techniques, so as to increase their agricultural productivity. Farmer's access to credit will enable them use tractors, which will lead to increased output of higher quality, thereby resulting in increased income and improved standard of living.

In this study, we seek to:

- describe the socio-economic characteristics of the fish farmers in Ogun State
- determine and compare the profitability level of beneficiaries and non-beneficiaries of NACRDB loan
- Highlight constraints militating against fish production in the study area.

METHODOLOGY

The study was conducted in Ogun State in south- western Nigeria. The state has an estimated population of over 3 million people according to National Population Commission (N.P.C, 2006). The state is located in the rainforest vegetation belt of Nigeria within longitude 2° 45' E and 3° 55' E and latitudes 7° 01' N and 7° 8' N in the tropics. The rainy season starts around the middle of March and continues until late October. The dry season starts in November and lasts until February in most locations in the state. Rainfall ranges between 1600mm and 900mm annually. The state is warm throughout the year with a temperature of between 28°C and 35°C, humidity is between 85 percent and 95 percent (Oloruntoba and Adegbite, 2006).

The state has marine and riverine biotopes estimated at 173.8 square kilometers (Adekoya, 2001; Ita and Sado, 1984) covering 12, 482,640 Ha, lacustrine biotopes totaling 4,404.35 Ha and estuarine biotopes covering a total of 767.3 km² (Ayansowo, 2003; Olaoye *et al.*, 2007) and is well endowed with natural water bodies such as springs, perennial flowing rivers, lakes and brackish waters.

There are twenty local government areas in the state. The capital of the state is Abeokuta. The main occupations of the people in the state are: agriculture, fishing, clothing, textiles and civil service. The study covered the whole four agricultural extension zones as classified by the Ogun State Agricultural Development Programme (OGADEP). The state was divided into four Agricultural extension zones namely: Abeokuta, Ilaro, Ijebu- ode and Ikenne (OGADEP, 2005).

Variables measured

The socio-economic variables measured were age (years), sex, educational level, marital status, family size and experience. Information on constraints militating against fish farming in the study area was sought from the farmers. Cost structures (variable and fixed cost) were also evaluated. A random sampling of sixty fish farmers was selected in Ogun State.

Data analysis

Data collected were analyzed using descriptive statistics (frequency, mean and percentages). The following budgetary techniques were employed to compute the profit and net profit as follows;

$$GMI = \frac{\sum TR - \sum TVC}{\dots\dots\dots} \dots\dots\dots (i)$$

$$TR = P_y \dots\dots\dots Y_i \dots\dots\dots (ii)$$

$$TVC = \dots\dots\dots P_{x_i} \dots\dots\dots X \dots\dots\dots (iii)$$

$$TC = TVC + \dots\dots\dots TFC \dots\dots\dots (iv)$$

$$NFI = \dots\dots\dots GM - \dots\dots\dots TFC \dots\dots\dots (v)$$

Where,

GMI= Gross Margin Income (₦)

TR= Total Revenue (₦)

TVC= Total Variable Cost (₦)

TC=Total Cost (₦)

NFI= Net Farm Income (₦)

P_y= Unit Price of Output Produced (₦)

Y= Quantity of Output (kg)

P_{x_i}= Unit Price of Variable input used (₦)

X_i= Quantity of Variable Input (kg)

The variable inputs used in this study include the cost of fixed materials, fish seed, variable materials and labour. In implicit form, the regression model is represented by;

$$Y = f(X_1, X_2, X_3, X_4, U) \dots\dots\dots (vi)$$

Where X are the explanatory variables, I= 1-4

U= Random Error Term

Multiple Regression Analysis

Multiple regression analysis was also used to estimate the magnitude of significance and relationship of the factors affecting total revenue of the farmers and the independent variables affecting production in the area. In implicit form, the regression model is represented by:

$$Y = f(X_1, X_2, X_3, X_4, X_5, U) \dots\dots\dots(vi)$$

Where X_i are the explanatory variables, $i = 1 - 5$

U = Random Error Term

In estimating through the regression analysis, the four functional forms used to estimate the relationship are:

Linear function

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + U \dots\dots\dots(vii)$$

Semi-log function

$$Y = a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + U \dots\dots\dots(viii)$$

Double- log (Cobb-Douglass)

$$\ln Y = a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + U \dots\dots\dots(ix)$$

Exponential function

$$Y = X^b \dots\dots\dots(x)$$

Where,

Y = Total revenue (₦)

X_1 = Cost of fixed materials (₦)

X_2 = Cost of fish seed (₦)

X_3 = Cost of variable materials (₦)

X_4 = Cost of labour (₦)

U = Error term.

From these, the equation of best fit was chosen. Z-tests were also used to test the levels of significance of the co-efficient; R^2 and F-test were also used to determine the extent to which the explanatory variables (X_i 's) could explain the relationship in the revenue-cost function.

Cost-Benefit Ratio (CBR or BCR)

Cost-benefit 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; **Benefit Cost Ratio (BCR)** = TR/TC

Where TR = Total Revenue

TC = Total cost

Rate of return (ROR) = NR/TC

Where, NR = Net Return

Gross Revenue Ratio (GR) = TFE/GI

Where, TFE = Total farm expenses and

GI = Gross income.

Net Profit Margin (NPM) = NR/TR

RESULTS

Socio-economic characteristics of fish farmers

Table 1 shows the socio-economic characteristics of fish farmers in Ogun state. It was observed that above 50.0% of the fish farmers fell between the age brackets 41-50 years, less than 30.0% were between the age brackets of 51 – 60 years. It was also shown that 76.7% of the respondents were male while 23.3% were females. Majority (80.0%) of the respondents were married, less the 15.0% were widow while 3.3% were single and divorced respectively. Result shows that most (55.0%) of the respondents had secondary education, followed by those who had tertiary education (33.3%) while 8.3% has primary education. Also from table 1, it was revealed that majority (48.3%) had fish farming experience ranging between 6 and 10 years, 20.0% had between 0 and 5 years of fish farming experience. The mode of land acquisition of the respondents were also examined, it was revealed that 45.0% of the respondents purchased their land while 35.0% inherited the land on which they are using for fish farming.

Table 1: Socio-economic characteristics of fish farmers

Parameters	Beneficiaries			
	Frequency	Percentages	Mean	SD
Age (Years)				
21-30	0	0.0		
31-40	7	11.7		
41-50	32	53.5		
51-60	17	28.3		
61&above	4	6.7		
Total	60	100	48.9	7.218
Gender				
Male	46	76.7		
Female	14	23.3		
Total	60	100		
Marital status				
Single	2	3.3		
Married	48	80.0		
Divorced	2	3.3		
Widow	8	13.3		
Total	60	100		
Educational level				
No formal education	0	0.0		
Adult education	2	3.3		
Primary education	5	8.3		
Secondary education	33	55.0		
Tertiary education	20	33.3		
Total	60	100		
Fish farming experience				
0-5	12	20.0		
6-10	29	48.3		
11-15	9	15.0		
16-20	7	11.7		
21&above	3	5.0		
Total	60	100	10.75	5.547
Land acquisition				
Inheritance	21	35.0		
Gift	7	11.7		
Lease/rent	4	6.0		
Purchased	27	45.0		
Others	1	1.7		
Total	60	100		

Economic analysis of the respondents and Profitability Ratios

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 2, reveals that the variable cost accounted for the largest proportion (76.43%) of the total cost of fish farming in the study area. 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 23.57% of the total cost. Also, the result shows that an average total cost (TC) of ₦ 1,827,258.12 was incurred by a respondent per cropping season while total revenue (TR) of ₦ 3,446,467.00 was realized with a returning gross margin (GM) of ₦ 2,049,849.37 and a net farm income (NFI) of ₦ 1,619,208.88. The analysis of profitability ratios in table 3 reveals that the Benefit cost ratio (BCR) was greater than one, Rate of Return

(ROR) is 0.88; Gross Revenue Ratio (GRR) is 0.89 while Expense Structure Ratio (ESR) is 0.31.

Table 2: Economic analysis of the respondents

Items	Beneficiaries	
	Amount ₦	% total cost
Variable cost		
Feed	1,243,856.00	68.07
Fish seed	80,291.67	2.33
Lime	100.00	0.55
Fertilization	1,446.09	0.08
Labour	26,504.31	1.45
Fuel	15,823.73	0.87
Transportation	14,883.33	0.81
Others	13,712.5	0.75
TVC	1,396,617.63	76.43
Fixed cost		
Land	16,966.43	0.93
Water pump	8,829.35	0.48
Concrete tanks	59,541.67	3.26
Deep well	25,157.00	1.38
Earthen pond	26,514.28	1.45
Plumbing materials	2,165.40	0.12
Shed	228,125.00	12.5
Drag net	9,654.64	0.53
Scale	240,972.00	13.18
Generator	40,575.87	2.22
Cutlass	2,036.67	0.11
Fencing net	3,117.50	0.17
Wheel barrow	1,174.93	0.06
Shovel	755.64	0.04
Head pan	551.04	0.03
Bowls	5,475.07	0.30
TFC	430,640.49	23.57
Total cost	1,827,258.12	100
Total Revenue	3,446,467.00	
Gross margin	2,049,849.37	
Net farm income	1,619,208.88	

Table 3: Profitability Ratios

Ratios	Value
Benefit cost ratio	1.88
Rate of return	0.88
Gross revenue ratio	0.89
Expense structure ration	0.31

Regression Analysis Result

The lead equations chosen for the respondents were double-log functions (Table 4). The functions have at least three of the variables significantly different from zero with relatively high R² and F values. The Cobb Douglas function showed four of the parameters significantly different from zero, but it was rejected because the sign of b₁ negates the a priori expectation on tools. Though the semi log function has four of its variables significant at

different probability levels (0.01 to 0.1), the relatively lower values of the co-efficient of determination, R² at 52.9%, and its adjusted value at 22.0% (when compared with the values recorded for the double log function at 16.0% and 3.81%), conferred the choice of the equation of best fit on the double log function for the beneficiaries. However, the overall significance of the variables used in all of the models was reflected in their F-values, ranging

from 4.23 to as high as 8.76 at a 1% level of significance (Table 4).

From Table 4, the adjusted R² value of the lead equation is 0.35. This implies that the regressors had explained about 35.0% of the total variation in the regress (total revenue), while the remaining 65.0% remained unexplained variables. Therefore, the lead

equation chosen is a double-log equation represented as:

$$Y = \ln Y = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4$$

(X₁ = 0.723), (X₂ = -1.788), (X₃ = 2.091), (X₄ = 0.111)

F-value = 7.76, R² = 0.39, Adj. R² = 0.35, Prob. > F = 0.0000

Table 4: Regression analysis

Model specification	α	X ₁	X ₂	X ₃	X ₄	R ² value	Adj R ²	F-value
Linear								
t-value	-0.12	1.02	-1.24	1.49	-0.26			
Sign	0.90	0.31	0.22	0.14	0.80	0.24	0.18	4.23
Semi-log								
t-value	-2.23	0.73	-1.84	2.01	-0.30			
Sign	0.30	0.47	0.07	0.05	0.76	0.22	0.16	3.81
Double-log								
t-value	-0.10	0.72	-1.79	2.09	-0.11			
Sign	0.93	0.47	0.08	0.04	0.91	0.39	0.35	8.76

From the lead equation, all of the variables are positively correlated with the regress and except X₂, which is the Cost of fish seed incurred by the farmers. This indicated their importance in determining the total revenue, hence in line with the a priori expectation. The result of the regression analysis revealed that, holding other variables constant, a 1% increase in Cost of fixed materials (X₁), Cost of variable materials (X₃), and Cost of labour (X₄) will result in a 0.72% increase for X₁, 1.78% decrease for X₂, 2.09% increase for X₃, and a 0.11% decrease for X₄, respectively, in revenue accruing from fish farming (Table 4)

Y= Total revenue (₦)

X₁= Cost of fixed materials (₦)

X₂= Cost of fish seed (₦)

X₃= Cost of variable materials (₦)

X₄= Cost of labour (₦)

DISCUSSION

The socio-economic characteristics of the respondents in Table 1 indicated that mean age of the respondents was 49 years; an age in which they are considered highly productive and active to undertake strenuous task associated with farm work. This is in line with the assertion of Bello (2000) that age has positive correlation with acceptance of innovations and risk taking as implicit on the credit borrowing for agricultural production. Also, past studies revealed that older farmers often tend to be more conservative or traditional and were afraid of taking risk, which the adoption of new farm technology entails

(Olomola, 1988). From the result obtained it was discovered that most of the fish farmers were male. This is a throwback to the traditional belief on women access to productive resources of which credit is one; this is however contrary to Lahai *et al.*, (2000), which seem to suggest that women participate more than men in most farming activities. However, aquaculture practices were not limited to a particular gender. Education is an important factor which can influence farm productivity and determines farmer’s access to loan and repayment, level of education according to the study showed that over 65% of the respondents have one form of education or the other. This is contrary to the general opinion that most farmers are illiterates or semi-illiterates; most of whom have dropped out of the formal, school system as evidence from the studies of Ozor (1998) and Okwoche *et al.* (1998). The mean fish farming experience is 11 years. All of the fish farmers are registered with one fish farmers association of their choice in their location. Most of the respondents purchased their land. From the variable cost of fish farming, it was indicated that feed accounted for 70% of the total cost of production (Table 2). This simply means that feeding is the most expensive variable cost when we talk of fish farming.

Economic analysis made from the study revealed that variable cost accounted for the largest proportion (76.43%) 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. Also, the result shows that an average total cost (TC) of ₦ 1,827,258.12 was incurred by a respondent per cropping season while total revenue (TR) of ₦ 3,446,467.00 was realized with a returning gross margin (GM) of ₦ 2,049,849.37 and a net farm income (NFI) of ₦ 1,619,208.88. The analysis of profitability ratios in table 3 reveals that the Benefit cost ratio (BCR) was greater than one, Rate of Return (ROR) is 0.88, Gross Revenue Ratio (GRR) is 0.89 while Expense Structure Ratio (ESR) is 0.31. 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 show analysis of ratios in table 3 reveals that the benefit cost ratio is above one emphasizing the profitability of fish farming in Ogun State. This result shows that fish farming as a business in Ogun state is viable since BCR is greater than one. The finding in this study compares favourably with that of Emokaro and Ekunwe (2009) who examined the efficiency of resource-use among catfish farmers to be viable. The rate of returns, 0.14 implies that for every one naira invested, N 0.14 was gained and a gross revenue ratio of 0.88 indicates that for every one naira return to fish farm enterprise, 88kobo is being spent. This also confirmed profitability. The result is supported by Emokaro and Ekunwe (2010) who examined the profitability and viability of catfish farming in Kogi state, Nigeria.

CONCLUSION AND RECOMMENDATION

The study explored the economic analysis of fish farming in Ogun State, Nigeria. It was discovered that the high cost of variable inputs in particular fish feed limits profitability in fish farming. Based on the findings the study, financial institutions need to be encouraged by the government to provide financial assistance to fish farmers in the country. This is expected to increase in their capital base, enhance economic empowerment, reduce cost of importing fish into the country and expand their production capacities in the rural areas. This may be as a result of the loan collected and low interest rate (8%) charged by the bank. The loan received helps them in further expansion of their business which increases profitability.

Therefore as a means of improving the production of fish in the study area, it is then recommended that Government should extend fund to the fish farmers with a subsidized interest rate, ©Fisheries Society of Nigeria

provide more infrastructural facilities that will reduce the cost of investing and more credits/loans should be available as an encouragement to people in this field.

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