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Profitability of Investment in Fish Farming Enterprise in Ibadan Metropolis, Oyo State, Nigeria

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To cite this article:
Oke Joel Taiwo Oluseye, Kehinde Ayodeji Damilola. Profitability of Investment in Fish Farming Enterprise in Ibadan Metropolis, Oyo State, Nigeria. *Ecology and Evolutionary Biology*. Vol. 4, No. 3, 2019, pp. 28-32. doi: 10.11648/j.eeb.20190403.11

Abstract: This paper investigated profitability of investment in fish farming enterprise in Ibadan metropolis, Oyo State, Nigeria. Specifically, it described the socio-economic characteristics of fish farmers in the study area, examined the cost and return to fish farming enterprise and determined the factors that affect investment in fish farming enterprise in the study area. The study was conducted in Ibadan metropolis, Oyo State, Nigeria. A multi-stage sampling procedure was used to select respondents for this study. A total number of 120 fish farmers were selected for the study. Data were analyzed using descriptive statistics, budgetary technique and multiple regression model. The results for the entire respondents showed average values of 46 and 10 years for age and years of experience, respectively. Majority of respondents were married (85%), male (93%) and educated (88%). The estimated costs and return to fish farming enterprise on the average in the study area were ₦ 749,661 and ₦ 615,761 per annum whereas the total revenue on the average was ₦1715, 512, while average total cost was ₦ 1,099,751. The benefit cost ratio and rate of return analysis were 1.23 and 0.35, respectively. Cost of feeding, cost of constructing pond, cost of labour, years of farming experience, household size, and cost of lime and fertilizer negatively and significantly (p<0.1) affect the investment in fish farming enterprise while profit expectation positively affects the investment in fish farming enterprise. Following the findings of the study, the government and non-governmental agencies should provide fish farmers with adequate access to credit facilities. Also, inputs should be made available to the fish farmers at the right time, quantity, quality and at subsidized prices.

Keywords: Profitability, Investment, Fish Farming, Enterprise, Ibadan

1. Introduction

Fish is an important and cheapest source of animal protein without religious taboo or any known cultural limitation [1]. It plays a prominent role in protein supply in the developing countries, Nigeria inclusive [2, 3]. Out of the required 35 g/individual/day of animal protein, fish should account for about 8g/person/day. Apart from its role in consumption, fish is also important in the provision of employment to a lot of people both rural and urban dwellers, Ibadan inclusive. The increase in the recognition of fish as a healthy food, low in calories and cholesterol level with rich protein source, the demand for fish has increased over time.

However, the fish production has not kept the pace with its demand. It has been observed that Nigerians are the largest fish consumers in West Africa with 1.4 million tonnes of fish consumed annually whilst the annual fish production in Nigeria was estimated to about 450,000 metric tonnes. Thus, the country needs to import about 900,000 tonnes of fish annually. To maintain the present per capital fish consumption level, about 2.0 million metric tonnes of fish will be required [4]. Whereas, less than 50% of the total annual fish consumed by Nigerians are produced locally [5].

Therefore, there is a need for establishment of more fish farms in order to boost the current production level of fish farming in Nigeria. The government of Nigeria has shown its interest through setting up of various national program and project such as the aquaculture and inland fishery project (AIFP), National Accelerated Fish Production Project (NAFPP), Fishing Terminal Projects (FTP), Fisheries Infrastructures Provision/Improvement (FIP), and Presidential Initiative of Aquaculture (PIA) [6].

Despite the interest shown so far by the government and the private sectors or establishments in the production of fish generally, the growth rate in fish farming is still very poor. This could be attributed to start up finance among other factors. Start-up finance is an essential tool necessary for the commercialization and intensification of enterprises [7]. It tends to be relatively high and may require long term financing arrangement, funds which are limited in quantity constitute the major source of capital for establishment, hence the limitations on operations. [8] opined that fish farming enterprise is highly capital-intensive enterprise, thus requiring big capital investment for reasonable profit to be made. Start-up capital is suggested to be one of the main factors hindering investment in fish farming enterprises.

Past literature–[9-12] on fish production in Nigeria has focused mainly on the economic analysis of fish farming, neglecting the investment and the factors affecting the investments which is one of the major problems facing the fish farming. This forms the focal point of this study. This paper investigated profitability of investment in fish farming enterprise in Ibadan metropolis, Oyo State, Nigeria. Specifically, it described the socio-economic characteristics of fish farmers in the study area, examined the cost and return to fish farming enterprise and determined the factors that affect investment in fish farming enterprise in the study area.

2. Methodology

2.1. Study Area

The study was conducted in Ibadan metropolis. Ibadan is located in Southwestern Nigeria and comprises of eleven local governments out of twenty-five local government that make up Oyo State. The State lies between Latitude 8^0 and Longitude 4^0 east bisect the State in four nearly equal parts. Ibadan is the capital city of Oyo State and the third largest metropolitan area in Nigeria after Lagos and Kano, it occupies a total land area of 3,080 square kilometers with a population of 1,338,659 [13]. Ibadan has a tropical wet and dry climate, with a lengthy wet season and relatively constant temperatures throughout the course of the year. Ibadan's wet season runs from March through October, though August sees somewhat of a break in precipitation. This break almost divides the wet season into two different wet seasons. November to February forms the city's dry season, during which Ibadan experiences the typical West African harmattan. The mean total rainfall for Ibadan is 1420.06 mm, falling in approximately 109 days. There are two peaks for rainfall, June and September. The mean maximum temperature is 26.46 C, minimum 21.42 C and the relative humidity is 74.55% Ibadan, an ancient city is well endowed with natural water resources flowing streams and rivers suited for commercial fish production. Some of the river tributaries includes: Osun, Ogunpa, Ona, Ogun and Asejire.

2.2. Sampling Technique

A two-stage sampling technique was used to select respondents for this study. The first stage involved a purposive selection of four Local Government Areas noted for active fish farming activities (Akinyele, Lagelu, Egbeda and Iddo) out of the eleven Local Government Areas (LGAs). This selection was based on the information that fish farming is carried out extensively in these areas with the aim of the fish farmers to make profit. The second stage involved simple random selection of 30 fish farmers from each of the four LGAs making a total of 120 respondents used for this study.

2.3. Method of Data Analysis

Descriptive statistics, budgetary technique and multiple regression model were used to analyze the collected data.

2.3.1. Descriptive Statistics

Descriptive statistics was used to describe the socio-economic variables such as age of the respondents, sex, level of education, household size, years of fishing experience and marital status amongst others.

2.3.2. Budgetary Techniques

Budgetary technique was used to analyze the cost and return to fish farming enterprises. Budgetary technique encompasses the analysis of cost components such as average fixed cost and average variable costs of various categories; production income, which is the total income or total revenue. In this study, production income is the monetary value of the output obtained by the fish farmer.

$$It\ is\ expressed\ as\ TI = PQ \qquad (1)$$

Where, P is the price per unit and Q is the quantity of output.

Production costs, also the total costs in this case, refer to the total expenditure or expenses incurred during a given period on a specified enterprise by the firm. It includes rent on land, pond construction cost, and cost of fingerlings, feed cost, cost of veterinary and drugs, transportation cost amongst others. Depreciation, which is a cost on fixed assets consumed during a given period. The common fixed assets used by small-scale fish farmers are water pump, fishing equipment etc.

Depreciation was calculated using the straight-line method.

Profitability model was expressed as follows:

$$TI = Q \times P \qquad (2)$$

$$TC = TVC + TFC \qquad (3)$$

$$GM = TI - TVC \qquad (4)$$

$$\pi = GM - TFC\ (depreciated\ value) \qquad (5)$$

Where,

TI = Total Income; Q = Quantity; P = Price; TC = Total

cost; TVC = Total variable cost; TFC = Total fixed cost; GM = Gross margin; π = Profit.

2.3.3. Profitability and Efficiency Ratio

Various ratios were computed to ascertain the extent of the profitability of fishing farming enterprise namely:

$$BCR = TI / TC \qquad (6)$$

$$ESR = FC/VC \qquad (7)$$

$$ROR = NR/TC \qquad (8)$$

$$GR = TC/TR \qquad (9)$$

Where,

BCR = Benefit cost ratio; ESR = Expense Structure Ratio; ROR =Rate of Return; GR = Gross Ratio

2.3.4. Multiple Regression Model

This was used to determine the factors that affects investment in fish farming enterprise.

The model for the regression was specified thus:

$$Y_i = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + ei \qquad (10)$$

Where,

Y_i = Amount of initial capital investment; X_1 = Age of respondent (years); X_2 = Family size; X_3 = Years of experience (years); X_4 = Number of fingerlings that make it to maturity; X_5 = Duration of feeding fish; X_6 = Feeding cost (₦); X_7 =Pond construction cost (₦); X_8 = cost of fertilizer and liming and (₦); X_9 = cost of labour (₦); X_{10} = expectation of the business profit (yes =1, no =0); e_i = error term.

3. Results and Discussion

3.1. Socio-economic Characteristics of Respondents

The socio-economic characteristics of respondents were presented in Table 1. The result revealed that fish farming enterprises seem to be a male dominated activity in the study area as about 93% of the sample farmers were males. This corroborates the study of [14] who affirmed that males dominate fish farming. Majority (85%) of the respondents were married. This shows that most of the fish farmers are with responsibilities that would make them willing to seek innovations so as to increase their income and improve their standard of living. Majority (88%) of the respondents have the level of education required to adopt new technologies in order to improve fish farming. The mean age of the respondents was 46.15 (±12.73) years. The finding is in agreement with the findings of [14], who found out that most of the fish farmers were in their economic active years. The mean years of experience of the respondents was 9.59 (±8.449) years. This shows that most of the fish farmers are fairly new in the enterprise and are in the process of attaining the level of experience required for best management practices in their fish farming enterprises. A few (37%) of the

respondents had access to credit. This shows that most of the fish farmers lack adequate access to credit.

Table 1. *Socio-economic characteristics of fish farmers.*

Variables	Fish Farmers
Age (years)	46 (±12.73)
Male (%)	93
Married (%)	85
Formal education (%)	87.5
Access to credit (%)	37
Years of farming experience	9.59 (±8.449)

Source: Authors' computation

3.2. Costs and Returns to Fish Farming Enterprises

Table 2 revealed the costs and returns to fish farming enterprises, using average unit of both costs incurred and yield or output data generated by each of the respondent in a season. The result revealed that the cost of feed accounted for the largest proportion (73.3%) of the total cost of fish farming enterprise in the study area. This finding is in agreement with that [14]. It is followed by the cost of water (15.4%), and immediately followed by cost of fingerlings (6.7%) while the least cost are fertilizers (0.5%) and lime (0.5%). The fixed cost of production consists of cost of land, pond construction, pond equipment such as nets, aerator among others. This accounts for 9.3% of total cost. This high value of fixed cost among fish farmers could be attributed to high cost of construction materials such as cements used in constructing a standard fish pond. Equally evident from the result, an average total cost of ₦ 1,099,751 was incurred by fish farmer in a cropping season while a returning gross margin of ₦749,661 and a net farm income (or profit) of ₦ 615,761were realized. This showed that fish farming enterprise in the study area is viable and the business of fish farming is profitable.

Table 2. *Costs and returns of the average fish farmer in the last cropping season.*

Item	Cost (₦)	Percentage (%)	
		(TVC)	(TC)
A. Variable cost			
Feed	708,152	73.3	64.4
Fingerling	64,346	6.7	5.9
Fertilizers	5, 005	0.5	0.5
Lime	5,010	0.5	0.5
Transportation	22,220	2.3	2.0
Water	148,500	15.4	13.5
Miscellaneous	12,618	1.3	1.1
Total variable cost (TVC)	965,851	100.0	87.8
B. Fixed cost			
Depreciation on fixed items (E.g. Pond construction, Borehole, water pump, Nets, aerator etc.)	112,650	84.1	10.2
Rent	21,250	15.9	1.9
Total fixed cost (TFC)	133,900	100.0	12.2
C. Total cost (TVC+ TFC)	1,099,751		100.0
D. Total Revenue (TR)	1,715,512		
E. Gross margin (D-A)	749,661		
F. Net returns/ Profit (D-C)	615,761		

Source: Authors' computation

3.3. Viability and Efficiency of Fish Farming Enterprise

Table 3 revealed that (BCR) is greater than 1 for fish farming enterprises irrespective of their pond typology. The value of the expense structure ratio was 0.14. This implies that about 14% of the total cost of production is made up of the fixed cost component of the fish farmers. The rate of return was 0.35. This shows that for every N1.00 invested by an earthen-pond farmer, 35 kobo is gained by the respondent. The gross ratio was 0.68. This implies that for every 1.00 returns to the enterprise, 68 kobo is spent. These measures of performance indicate that fish farming enterprise in the study area is viable and the business of fish farming is profitable.

Table 3. Viability ratios of fish farmers' groups.

Ratio	Fish farmers
	value
Benefit Cost ratio	1.23
Expense structure ratio	0.14
Rate of returns	0.35
Gross ratio	0.68

Source: Authors' computation

3.4. Factors Affecting the Investment in Fish Farming Enterprises

The factors affecting the investment in fish farming enterprises were presented in Table 4. The R-Square was 0.52. This suggests that 52% of the variability in the investment of the respondents is jointly explained by variations in the specified independent variables considered in the model. The F-Value obtained (10.26) indicates that the overall equation is statistically significant at 1 percent ($p < 0.01$). Household size ($p < 0.1$) was negative and significant, this implies a unit increase in numbers of persons in a household will decrease in amount of initial capital of the fish farm by 0.232 units. Years of farming experience ($p < 0.1$) was negative and significant, this implies a unit increase in years of experience will decrease in amount of initial capital of the fish farm by 0.101 units. Cost of feeding ($p < 0.1$) was negative and significant, this implies a unit increase in cost of feeding will decrease in amount of initial capital of the fish farm by 0.001 units. Cost of constructing pond ($p < 0.01$) was negative and significant, this implies a unit increase in cost of constructing pond will decrease in amount of initial capital of the fish farm by 0.132 units. Cost of labour ($p < 0.1$) was negative and significant, this implies a unit increase in cost of feeding will decrease in amount of initial capital of the fish farm by 0.024 units. Likewise, Cost of fertilizer and liming ($p < 0.05$) was negative and significant, this implies a unit increase in cost of feeding will decrease in amount of initial capital of the fish farm by 0.512 units. Profit expectation ($p < 0.01$) was positive and significant, this implies a unit increase in cost of feeding will increase in amount of initial capital of the fish farm by 0.321 units.

Table 4. Factors affecting the investment in fish farming enterprises.

Variable	Linear form
Age of farmers	0.002 (0.02)
Family size	-0.232 (-0.74)
Years of experience	0.101 (1.19)
number of fingerlings that make it to maturity	0.001 (0.04)
Duration for feeding fish	0.021 (0.25)
Feeding cost	0.001** (2.50)
Pond construction cost	-0.132*** (-6.28)
cost of fertilizer and liming	-0.512** (-2.43)
cost of labour	-0.024* (-1.65)
Expectation of the business profit	0.321*** (3.77)
R^2	0.52
adjusted R^2	0.49
F-test	10.26

***; ** and * indicated variables that are significant at 1; 5 and 10 percent respectively.
Figures in parentheses () are t-values.

4. Conclusion

This paper investigated profitability of investment in fish farming enterprise in Ibadan metropolis, Oyo State, Nigeria. A two-stage sampling procedure was used for selecting respondents for this study. A total number of 120 farmers were selected for the study. The study concluded that fish farming enterprise is a relatively profitable and viable in the study area. However, fish farming enterprise could be more profitable, if the cost of investment in the enterprise could be controlled. The costs of feeding, constructing ponds, labour, lime and fertilizers which are very important in the fish farming, negatively affect the investment in fish farming enterprise whilst profit expectation positively affect the investment in fish farming enterprise. All these significant variables should be taken into consideration in an effort to increase investment in fish farming enterprise. Therefore, the government and non-governmental agencies should provide fish farming enterprise with adequate access to credit facilities. Also, inputs should be made available to the fish farmers at the right time, quantity, quality and at subsidized prices.

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