IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 11, Issue 2 Ver. II (February 2018), PP 47-52
www.iosrjournals.org

Economic Returns and Employment Generation Potentials of Artisanal Fishing in Ondo State

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Abstract: *This Paper estimated input elasticities and factors influencing net returns among artisanal fish farmers with the aim of providing insights to the absorptive capacity of artisanal fishing in Ondo State. Data were collected from 120 Fish Farmers with the aid of structured questionnaire supplemented with oral interview. Data were analyzed using descriptive statistics, budgetary technique and regression analysis. Findings show that fish farmers in the area were young with mean age of 32.5years while majority of them (90%) had acquired formal education. Results of profitability analysis and cost benefit ratio showed that artisanal fish farming was economically rewarding to sustain the interest of fish farmers and induce new entrants. Estimated inputs elasticities indicated that hired and family labour were elastic suggesting over utilization of labour resource. Result of input elasticities and return to scale indicated that the industry still has some absorptive capacity for new entrant and expansion of operations of the existing farms. It was recommended that fish farmers should be empowered through loans to purchase modern equipment in order to increase their production fromtier and encourage more youths in the fishing communities.*

Keywords*: Economic returns, employment generation, potentials and artisanal*

Date of Submission: 13-02-2018 Date of acceptance: 27-02-2018

I. Introduction

The Nigerian fishery industries consists of three broad subsectors: The artisanal (or small scale fisheries) the industrial (or large scale fisheries) and the aquaculture(or fresh water fisheries). Of these three subsectors, artisanal fishing constitutes the most significant subsectors in terms of the numbers of people employed and the contribution to total fish output in the country. Fish farming plays a significant role in Nigerian Economy because it generates income for categories of fish farmers; requires less space, time, money and a higher feed conserving rate; makes use of some finished products from small and large industries like boats, ships net and other fishing equipment, source of good quality protein; has a multiplier effect of rural development through improvement and provision of social amenities to the fishing communities ; serves as a source of raw materials to the manufacturers and producers of all types of feed and animal rations and a valuable source of food protein superior to plant protein in terms of balanced amino – acid.

The contribution of fisheries to Nigerian Economy is more significant when viewed from the supply of animal protein and macronutrient requirements, income generations, rural development, exchange earnings and employment generation potentials (Lawal,Obatola and Giwa 2016) . One of the notable importance of fish farming in Nigeria Economy is employment generation Many youths earn their living from fish farming, harvesting, processing operations, selling, preservation and even as fish pond assistants. These job opportunities in the fishing communities increase as artisanal fishing undergoes a transition from the traditional orientation involving the use of wooden dug out canoes with wooden paddles to the introduction of out – board engines and the availability of medium to large scale trawlers thereby making artisanal fishing attractive to secondary school and university leavers particularly graduates of fishery and aquacultures

Fish has become a popular consumable in Nigeria not only because of its importance in human and livestock diets as stated earlier, but because it is cheaper, readily available, easy to process and available in different forms as fresh dried, smoked, canned amd frozen. In addition, its consumption cuts across all religious divides (USAID 2010). Sequel to this, the demand for fish and fishery products in Nigeria has increased tremendously thus widening the domestic demand and supply gap. Ovie and Raji (2006}. placed the current consumption and demand rate at 1.2 and 1.5million tones respectively. This implies a per capital consumption of 7.5kg, 8.5kg annually which is still less than 13.5kg per day recommended by The World Health Organization (WHO).

Oyinbo and Rekword(2013) reported that Nigeria annual fish demand was 2.66 million tones and a miserable domestic production of about 780,000 tonnes leaving a demand supply gap of 1.8million tonnes. This is suggesting that as important as fish and fish farming is in Nigeria, its supply out – strips its ever-increasing demand. This gloomy situation of fish industry calls for an urgent attention of all and sundry

In order to salvage this situation, the animal unit of the Agricultural Development Project all over the country has been disseminating information on improved fishing technologies, organizing seminars on modern fish rearing methods and encouraging interest groups and prospective fish farmers particularly youths to make use of available space at the backyard, unused plots, etc for fish farming

Despite all this, the problem of fish inadequacy remains largely unresolved due mainly to (1) the use of archaic fishing methods and tools, which are labour intensive (2) inability of fishermen to acquire the basic infrastructural facilities like mould board engines trawlers and modern preservation methods to reduce post harvest losses, (3) Proper fish handling, distribution and marketing (4). Inaccessibility of fish farmers to regular source of finance to purchase modern equipment (5) Seasonality of water availability which prevents all year round fishing activities and (6) flooding of ponds due to poor management during raining season.

From the forgoing considerations, it is imperative to undertake an indepth economic study of artisanal fisheries in order to accumulate sufficient and reliable economic data that would provide reliable information for meaningful policy formulation and to provide insights to the absorptive capacity of artisan fishing in Ondo State. While this study will add to the existing knowledge on artisanal fish farming provided by past authors such as Aderinola and Oladimeji (1999),Suleiman (2007), Anyanwu and Ohaka (2009), Lawal, Obatola,and Giwa (2016) among others, its unique contribution rests on the attempt to blend the economic characteristics with employment generation potential inherent in the fishery sector. It is against this background that this study will answer the following research questions:

1) What is the level of profitability in artisanal fish farming and how attractive is it to the youths in the fishing communities
2) What are the factors influencing net returns to fishing efforts?
2) How do we assess the employment generating potentials of the fishing activities

The Objectives of the study are to:

estimate the net returns per kg of fish caught per farmer;

identify and estimate factors influencing net returns to fishing efforts and

examine the economic characteristics and employment generating potentials of artisanal fishing in the selected communities.

II. Materials And Method

Study Area and Data Collection

Ilaje and Eseodo Local Governments were purposely selected because of fishing prominence in the local governments Two communities each were also selected in the local governments because of the same reasons. These communities namely Igbokoda, Atijere, Igbobi and Aboto were selected because of the large bodies of water known for artisanal fishing activities. Artisanal fishing is the most important enterprise in the area. The fishing season opens from the end of the rainy season (usually October) to the beginning of another raining season (Usually April). At the onsets of rains, most fishermen engaged in other non – fishing activities mostly farming for additional income and also to keep them busy during lean period.

. Thirty fishermen were randomly selected from each community making a total 120 respondents in all. Structured questionnaire was used to elicit information from the fishermen on their age, marital status, annual income from fishing, no of years spent in school, costs and revenue structure, household sizes and major/subsidiary occupations, qualities of fish caught, sale, price/kg of fish caught, quantities given to friends and consumed and manday of labours. The questionnaire was supplemented with oral interview.

III. Method of Data Analysis

Descriptive statistics such as mean, mode, percentages and frequency tables were used to discuss the socio – economic characteristics and the employment generation potentials of the respondents. Budgetary technique was used as stated below:

$NR(N_i)^{-1} = (TR_i - TC_i)(N_i)^{-1}$----------(1)

NR= Net revenue from sale of fish in the i^{th} LGA

TR_i=Total Revenue from the sale of fish in the i LGA

TC = Total cost of artisanal fish production in the i^{th}LGA

Q_i =Quantity of fish caught in the LGA

N_i = Number of artisanal fishermen interviewed in the i^{th}LGA

TC = TFC +TVC

GM = TR – TVC

NP = TR – TC

Where

TC = Total Cost

TFC = Total Fixed Cost

TVC = Total Variable Cost

The TFC consists of depreciation values of fishing canoes, paddles, nets, out-board engines and tax levies. TVC consisted of wages of labour, inputed cost of family labour, cost of fuel, lubricants maintenance charges while total revenue consists of sale of fish, imputed family consumption and estimated value of fish given to friends.

Ordinary least square (OLS) technique of regression analysis was used to estimate fish production function. It was used to estimate the relationship between the dependent variables and independent variables. It was used to compute returns to scale by first estimating the production elasticities with respect to each input. The hypothesized production function for artisanal fisheries in Ondo state was tested using four different functional forms; Cobb Douglas functional form (Linearized in Logarithm) filted the observed data very well using the evaluative criteria .

$Q_i = f(X_{ij}, \ldots\ldots\ldots\ldots..X_{2j}, X_{3j}, X_{4j}, X_{5j}, X_{6j},$ ----------(2)

where

Q_j = Annual income income from fish sold

X_{ij} = No of Fishing trips/seasons

X_{2j} = Mandays of hired labour employed by the jth fishermen

X_{3j} = imputed mandays of family labour used by the jth fishermen

X_{6j} = Cost of fuel *(₦)*

e = error term(which was assumed to be normally distributed with zero mean and constant r

The linearized Cobb – Douglas functional form fitted into data. The explicit form is presented in equation (3)

$\text{Log } Q_j = a_0 + a_1 log X_{ij} + a_2 log_2 X_{2j} + a_3 log_3 X_{3j} + e$

where a_1……..a_2 = represent the estimated parameters while all variables remained as earlier defined

IV. Results And Discussion

Results of the Socio – Economic characteristics of interest to this study shows that 80% of the respondents were between 20 – 39 years while the mean age was 32.5years suggesting that youths constitute the active labour force in fish production in the area in affirmation of this finding, Fapounda (2012) found out that fish Production is in the hands of youths. Majority of the respondents (90%) had a household size of four people and below indicating that there are chances of re- investing other income for more returns even though there may be shortage of family labour. Similarly. about Ninety two Percent (91.66) of the catfish farmers had acquired one form of education or the other which further confirmed the attractive nature of catfish to the youths/

TABLE 1: Socio Economic Characteristics of Catfish Producers in Ondo State

Age	Frequency	Percentage
20 – 24	15	12.50
25 – 29	25	20.83
30 – 34	40	33.33
35 – 39	30	25.00
40 and above	10	8.33
Total	120	99.99

Household size		
≤ 2	20	16.66
3 – 4	85	70.83
5 – 6	15	12.50
Total	120	99.99

Level and Education		
No formal education	15	12.50
Primary Education	10	8.33
Secondary Education	52	43.33
TertiaryEducation	30	25.00
Adult Education	13	10.83
Total	120	99.99

Less than 100 because of rounding up errors.

Source: Data Analysis

Profitability Analysis of Catfish production in Ondo State

The Profitability analysis of catfish farmers in ondo state is presented in Table 2. The mean variable cost expended was 150,370.20 while the average total cost (ATC) was 155,174.00.The Total Variable cost

accounted for about 96% of the total cost of producing artisanal fish in the selected areas of Ondo State. The mean Gross margin was N59,830 while the net profit was N55,026 all suggesting that catfish production is a profitable enterprise in Ondo State. The GM was more than NP because in calculating GM, only the total variable cost was used while depreciation is included in determining the net profit. The cost Benefit ratio (BC) was 1.35 indicating that for every N1 resource employed in catfish production, a farmer made revenue of N1.35 which is a further confirmation of profitable nature of catfish production in the area.

Table 2: profitability Analysis of catfish production in Ondo State

Variables	Mean (N)	Std deviation	%
TVC	**150,370.2**	**105,055.90**	
DEP	**4,804**	**2372.28**	
TC	**155,74**	**104736**	
TR	**210,200**	**157,550.70**	
GM	**59,830**	**65,285.63**	
NP	**55,026**	**60,215**	
%TVC/TC	-	-	**96.90**
GM as % TR	-	-	**38.56**
%NP/TR	-	-	**26.18**

Source: Data Analysis

.**Note:** Estimates were for 8months of fishing in the community

Std – Standard deviation

Estimated Production Model for Catfish in Ondo State

Catfish production functions were estimated by using stepwise regression techniques. The Cobb – douglas functional form (Lineariszed in Logarithm) fitted the observed data very well according to the econometric criteria earlier listed. The results are presented in equation (4)

$\text{Log } Q_j = 6.794 + 0.000LogX1 + 4.34LogX_2 + 1.01LogX_3 + 3.71LogX_4$

(0.0697) (0.001) (0.000) (0.000) (0.001)

$\text{Log } Q_j = 6.794 + 1.01LogX_3 + 3.71LogX_4 + 3.04LogX_5 + 1.012LogX_{10}$

(0.697) (0.000) (0.012) (0.016) (0.130)

X_1 = Price/Kg of fish; X_1 = Price of Catfish seed(N); X_3 = Price of feed(N)
X_4 = Hired Labour in Mandays ; X_5= Cost of Fuel(N); X_6 = Farmers Age (/yrs)
X_7 = No of Years spent in school; X_8 = Farmers Experience (Yrs) X_9 = Household Size
X_{10} = Family Labour (Mandays); X_{11} = Type of Pond Used

Significance Level = 5%

$R^2 = 0.649$ F = 11.242

(indicates that estimated coefficients were significant at the 5.0% level while the standard errors of estimated coefficients are in Parenthesis

In Equation 5, the coefficients of multiple determination (R^2) for the lead equation shows that about 65% of the variability in the quantity of fish caught per fisherman is accounted for by the explanatory variables while "F – Test" indicated that the model was highly significant at 5.0% level. All included regressors carried the sign having physical and economic

logic with the "t – test" showing that they were significant at 5.0% level. Equation 5 shows that price of cat fish seed (~~N~~), Price of fish feed, hired labour in man – days, cost of fuel(N) and family labour were the significant/major determinants of the quantity of fish caught per farmer and they all carried the expected positive sign indicating that a 1% increase in these regressors will lead to corresponding increase in the quantity of cat fish harvested. On the other hand, age carried a negative sign, indicating that the older a fish farmer, the less the quantity of fish caught conforming with a priori expectation

Input Elasticities and Returns to Scale

Return to scale measures the effect of a change in factors inputs by the same proportion and in the same direction. There is an increase in the scale of production. If a farmer increases all his inputs by the same magnitude say 5%. The corresponding change in output is an indication of the type of return to scale. For instance if an increase in the scale of production leads to more than proportional increase in output, we have an increasing return to scale. It is decreasing return if output increases less than proportionately. It is constant return to scale when output increases by the same proportion as all inputs. In Cobb – Douglas production function, the sum of all regression coefficients is an indication of return to scale.

This principle was used in explaining table 3

Table 3 Estimate of Input ELasticities and Returns to Scale for Artisanal Fishing in Ondo State

Production Inputs	Elasticity Estimates
Pondsize Season	0.140
Quantity of Fish Feed Used	0.102
Hired Labour	1.110
Quantity of Fuel Used(litres)	0.040
Family Labour	1.1012
Return to Scale	**2.713**

From Table 3, the sum of regression coefficients was 2.713. This implies that if all the factors employed by fish farmers covered by this study were to be increased by 1.0%, it would result in increase of 2.713% in output (elastic). This shows that catfish farmers in the state were producing at an increasing return to scale at the stage 1 of the production surface.

Table 3 further shows that the quantity of fish caught by the fishermen were inelastic with respect to inputs like no of fishing trips, quantity of feed fed to the fish and quantity of fuel used to power the engine. This was corroborated by Aderinola and Oladimeji(1999). On the other hand labour was elastic

Economic Characteristics and Potentials of the Artisanal Fishery for Employment Generation in Ondo State

The information provided on costs, returns and profitability of artisanal fishing activities in Ondo State (Table 2) could provide a strong basis for an argument that artisanal fishing activities in the selected fishing communities is economically rewarding. Given the common property(open access) nature of the fishery, the reported high margin between fishing costs , revenue and net profit would induce potential fishermen to go into fishing and existing fishermen to increase their fishing effort, that is expand the scale of their operations. Economic theory postulates that the influx of new entrants into the artisanal sector of the fishery industry under consideration would continue as long as there exists resource rent (excess revenue over costs) (Edmond 1988). Similarly, Oyinbo and Rekwort (2013) in their affirmation of this finding posited that profitability is important in encouraging new entrants and sustaining the interest of the existing fish farmers. Entry into the fishing industry would stop only when all resources rent have been dissipated i.e when the industry attains equilibrium. The findings in this study particularly table 2 indicates that the industry has not yet attained equilibrium since a large amount of resource been reported. Also, the estimates of input elasticities and return to scale in Ondo State(Table 3) shows that more people are still needed in the industry. Hired labour and family Labour had elasticity estimates of 1.10 and 1.012 respectively indicating that they are elastic. This means that a 1% increase in labour resource would lead to more that 1% increase in the quantity of fish caught per farmer. This suggests that there was over utilization of labour resource in artisanal fisheries in the state and therefore more hands are needed in the fishing industry. .

V. Summary And Conclusion

This paper describes the main economic features of the fishery sector in Ondo State and highlights its potentials for rural employments generation. In addition, the factors influencing net returns to fishing efforts were identified and estimated using regression analysis .With the mean age of 32.5years and about 90% acquiring one form of education or the other, artisanal fishing is likely to be sustained in the fishing communities of the state. Results of profitability analysis specifically the benefit cost ratio shows that artisanal fish farming is economically rewarding in the state to sustain the interest of the farmers and encourage new entrants. These findings indicate that the industry has not yet attained equilibrium since a large amount of resource rent has been reported. This coupled with the estimates of inputs elasticities and returns to scale can lead to a safe conclusion that the industry still has some absorptive capacity for new entrants and expansion of the operations of existing firms. Thus the paper recommends that aquaculture production would be expanded from its present level (stage 1) of production (region) by empowering the fish farmers through loans to purchase more modern fishing equipment and provision of effective fishery extension services. It is believed that this will increase the production frontier and extend the absorptive capacity for more entrants. However the extent of the absorptive capacity can be estimated in further studies on artisanal fishing in Ondo State.

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