

# Profitability Analysis of Artisanal Fishing in Ilaje Coastal Communities of Ondo State

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**Abstract** Fishery sector in Nigeria plays an important role in terms of national food security, employment, enterprise development and foreign exchange earnings. Increasing efforts to raise the productivity of fishery can be an important measure to put the country on the threshold of food security. This study examined profitability of artisanal fishing in coastal communities of Ondo State. Purposive and random sampling techniques were used in selecting one hundred and twenty (120) respondents for the study. Descriptive statistics, gross margin and multiple regression were the analytic tools used for the study. The results revealed the mean age of fishermen to be 30 years with an average fishing experience of 12 years. The study also shows low level of education among the fishermen. The results show that the enterprise is profitable with total revenue of ₦ 1,356,852.58 and a profit of ₦663,076.41. The results also show that age of the farmer, fishing experience, distance onshore, cooperative membership, credit access and amount of catch were the socio-economic variables that affect income. The study recommended that the strict conditions on collaterals for accessing credit by fishermen should be relaxed to enable more fishermen access loans for increased fish production. Fishing gear and crafts should be subsidized to encourage artisanal fishing.

**Keywords:** *artisanal fishing, profitability, coastal communities, Ilaje*

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## 1. Introduction

More than 60% of world protein supply is derived from fish especially in the developing countries. Nigeria as a maritime nation with a vast population of over 201 million people and a coastline measuring approximately 853 kilometer's, fish production as an enterprise possesses the capacity to contribute significantly to the agricultural sector [1]. With an annual fish demand in the country of about 2.66 million tons, and a paltry domestic production of about 780,000 tons, the demand-supply gap stands at a staggering 1.8 million tons. Fish is major source of readily available protein in Nigeria and the most common in the coastal areas of Ondo State. Fish is an important source of protein which is highly needed for human beings to experience necessary growth and development, Oparinde and Ojo [2]. The acceptability of fish in most communities of the world is due to fish tenderness and high digestibility compared to beef, mutton, chicken and bush meat and its consumption is without taboo associated with most meat products Adeleke [3].

Coastal fisheries are important and contribute significantly to fish production. The global capture fisheries production stood at 90.9 million tonnes in 2016 with fisheries in marine and inland waters provided 87.2

and 12.8 percent of the global total, respectively [4]. In coastal communities where fishing forms the mainstay of the economy, fishing may provide direct or indirect economic opportunities for the coastal dwellers. Artisanal, capture-based aquaculture, fish gear fabrication, fish businesses, boat and fishing vessel mechanics and fish processing are some of the numerous fishing and allied economic activities providing source of income for the people. According to [5] fish production in Nigeria is mainly made up of captured fish and aquaculture production. Captured fish represents the bulk of the fish produced and consumed in the country. Artisanal fishing typically involves using small boat and canoes, it accounts for more than 25% of the world catch, it is the source of more than 40% of the fish used for human consumption [6]. This sector provides the bulk of the fish consumed in Africa and it involves marine (coastal) areas and inland water bodies.

The quantity of fish produced in Nigeria could not still equate the quantity consumed hence; this gap is being filled up by imports from other countries. Fisheries society of Nigeria (FSN) (2016), reported that 50% deficit supply of fish requirement is met through importation, which constitutes a huge avoidable drain of Nigeria's scarce foreign exchange. Artisanal fish production in Nigeria is characterized with lack of credit facilities from the government, lack of storage facilities, and proximity for

buyers. The effect is the low level of output of fish that could not meet with demand for the products. Considering the vast coastal resources that abounds in Nigeria, artisanal fishing if strengthened, has the potential to significantly contribute to domestic fish supply. Two policy questions therefore arise; i. Why has the country not yet attain self-sufficiency in fish production despite the huge water bodies? ii. What is the mode of operation of artisanal fish farmers in the study area? It is therefore imperative to examine the profitability of fishing in Ilaje coastal communities, Ondo State

## 2. Materials and Methods

This study was carried out in Ilaje local government areas of Ondo state, Nigeria. The state lies between latitude 5° 45' and 7° 52' N and longitudes 4° 20' and 6° 05' E. Its land area is about 15,500 square kilometers. Ondo state was created from the old Western State on February, 1976. In October 1996, it is bounded on the East by Edo and Delta states, on the West by Ogun and Osun States, on the North by Ekiti and Kogi states and to the South by the Bight of Benin and the Atlantic Ocean. Ondo state has eighteen (18) local Governments areas and out of these 18 LGAs, Ilaje is predominantly coastal wetlands. The state is situated within the mangrove rain forest and has an annual rainfall ranging from 2000-3000mm per annum. This area was selected for the study because of the suitability for fishing activities as it is close to the rivers where fish are always available for consumption. The Ilaje Local Government Areas (LGA) has the Atlantic Ocean as its neighbor hence a lot of artisanal fishing is done in the area.

Primary data was used for the study. The primary data was sourced from a set of structured questionnaire administered on artisanal fish farmers through personal interview

Purposive and random sampling technique was used in the selection of the respondents in the study area. Purposive sampling technique was used to select three (3) communities from Ilaje Local Government Area based on the predominance of fishing activities in these communities while random sampling technique was used to select forty (40) artisanal fish producers from each of the communities, making a sample size of 120.

Descriptive statistics such as frequency, percentage, charts, tables, graphs was used to present the socio-economic characteristics of the fishermen as well the constraints to fishing. Multiple regression analysis was used to examine the effects of selected socio-economic characteristics on income. The implicit form of the model is presented thus as:

$$Y = f(X_1, X_2, X_3, X_4 + \dots + X_9 + \mu) \quad (1)$$

Where,

Y= Income (naira)

X<sub>1</sub>=Age (years)

X<sub>2</sub>=Distance of farmer's residence to river (metres)

X<sub>3</sub>=Household size (Number of persons)

X<sub>4</sub>= Level of Education (years spent in school)

X<sub>5</sub>= Credit Accessibility (Yes 1, No 2)

X<sub>6</sub>= Fishing experience (years)

X<sub>7</sub>=Average amount of catch (Kg)

X<sub>8</sub>= Time spent onshore (Hours)

X<sub>9</sub>= Membership of cooperative society (Dummy Member 1, non-member 0)

μ=error term.

Three functional forms will be tried on the regression model analysis in order to get the one that best fits the data. These functional forms included linear, semi-logarithmic and double-logarithmic functions. The general forms of this function are specified as follows:

Linear function:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \dots + b_9X_9 + \mu$$

Semi-log function:

$$Y = b_0 + b_1\ln X_1 + b_2\ln X_2 + b_3\ln X_3 + b_4\ln X_4 + \dots + b_9\ln X_9 + \mu$$

Double-log function:

$$\ln Y = b_0 + b_1\ln X_1 + b_2\ln X_2 + b_3\ln X_3 + b_4\ln X_4 + \dots + b_9\ln X_9 + \mu$$

The profit margin of artisanal fishing was estimated using gross margin analysis. It is given as follows;

$$GM = TR - TVC \quad (2)$$

Where: GM = Gross margin in naira/fisherman/month

TR = Total revenue in naira/fisherman/month

TVC = Total variable cost in naira/fisherman/month

## 3. Results and Discussion

### 3.1. Socio-economic Characteristics of Artisanal Fishermen

The socio-economic characteristics of artisanal fishermen are presented in Table 1. The Table revealed that the majority (67.0%) of the fishermen were within the age bracket of 26 and 41 years, indicating that they were mainly youth with high vigour and energy to contribute meaningfully to fishery development. This result agrees with the findings of [1,7] which found that majority of fishermen in Nigeria were youths who are in their active ages. The Table also revealed that all (100.0%) of the sampled fishermen were males. This result could be attributed to the fact that artisanal fishing is a laborious activity that requires mostly the strength of men than women. [1] noted that, it is a *a priori* expectation to have more male in artisanal fishing than female.

The findings of [8] also conforms with this study which reported male dominance of artisanal fishing. The result revealed that majority of the respondents 73.3% were married, while 25.8% were single, only 1% of the respondents were separated. This implies that the highest proportion of the fishermen were married suggesting strong attachment to matrimonial institution. In most fishing households visited for the survey, artisanal fishing is taken as a family business and most family members involved in fishing at one stage and the other. The marital status of the fishermen had a lot of influence on their

production performance as family members could facilitate fishing activities, [9]. This result is consistent with the findings of [10] which reported that married men dominate artisanal fishing. The results further revealed that more than half of the respondents sampled had family size ranging between 6 and 10 persons which accounted for 67.6% of the total sampled fishermen. About 10.8% had family size between 1 and 5 persons while those whose family size ranged between 11 and 15 persons represented 17.5%. However, about 4.0% of the respondents had family size greater than 16 persons. The mean household size was eight persons. This implies that family size of sampled fishermen is relatively large and this could provide great advantage in terms of needed labour for artisanal fishing in the study area. The finding supports the preponderance of large family sizes among the poor in rural areas [11].

**Table 1. Socio-economic Characteristics**

Variable	Percentage
<b>Age</b>	
18-25	33.3
26-33	35.8
34-41	22.5
42 and above	8.3
<b>Mean</b>	
<b>Sex</b>	
Male	100.0
Female	0.0
<b>Marital Status</b>	
Single	1.0
Married	26.0
Seperated	73.0
<b>Household Size</b>	
1-5	10.8
6-10	67.6
11-15	17.5
16 and above	4.2
<b>Mean</b>	
<b>Years Spent in Years</b>	
No Formal	22.5
1-6	45.8
7-11	25.0
12 and above	6.6
<b>Fishing Experience</b>	
1-10	53.3
11-20	30.9
21-30	14.2
31 and above	1.6

Survey, 2018.

Table 1 shows the educational attainment of the respondents in the study area. Table 1 reflects that 22.5% of the respondents did not attend school at all, 45.8% spent between 1 - 6 years in school, 30.8% spent between 7 – 12 years in school, while less than 1.0% spent more than 12 years in school. It could be concluded that there is low level of education among fishermen in the study area. These findings corroborates the findings of [7,11], where they opined that the fisher-folks are illiterates or semi-illiterates; most of whom have dropped out of formal school system. The low level of education among fishermen could be due to the isolation and marginalization of Ilaje coastal communities because of its

difficult terrain. Hence, limited number of schools is available for accessibility by the coastal dwellers. The distribution of respondents according to years of fishing experience revealed that fishermen who had fishing experience less than or equal to 10 years accounted for 53.3% while those whose fishing experience ranged from 11 years to 20 years accounted 30.9%. Also, 14.2% of the respondents had fishing experience ranging between 21 and 30 years while 1.6% of the respondents had above 31 years of experience in fishing. [12] opined that higher fishing experience had a significant importance in enabling fishermen fishing to maneuver or handle gears effectively.

### 3.2. Effects of Selected Socio-economic Variables on Income

The Ordinary Least Squares (OLS) regression analysis was carried out to determine the effects of selected socio economic variables on income. Three functional forms were tried: linear, semi logarithms, and the double logarithms functions. The double logarithms form was found to be the lead equation of the regression. It was selected based on the magnitude of  $R^2$ , Adjusted  $R^2$  and the significance of the overall regression as judged by the F- ratio and the significance of the individual coefficients. The regression results is significant at 5% level and the coefficient of determination ( $R^2$ ) was 0.452 (Adjusted  $R^2$  0.408). This implies that the included variables were able to explain about 41% of the effects of selected socio economic variation on income. The F-ratio was 10.098 and is significant at five percent level, implying that the joint effects of all the included variables were significant. The results revealed that six out of the nine variables included in the model were significant. Age of farmer, fishing experience, distance onshore, cooperative membership, credit access and amount of catch were the socio economic variables that explained changes in income of artisanal fishing in the study area.

**Table 2. Multiple Regression Analysis on Effects of Selected Socio-economic variables on Income**

Variables	Coefficients	Standard error	t value	P value
Constant	15.557	0.283	54.943	0.000**
Age	0.004	0.001	3.439	0.001**
Household size	0.11	0.11	0.979	0.330
Years of Education	0.012	0.009	1.265	0.209
Fishing experience	0.014	0.007	2.110	0.037**
Distance on shore	0.002	0.001	2.628	0.010**
Time on shore	0.059	0.031	1.902	0.060
Coop membership	0.209	0.900	2.310	0.023**
Credit access	0.231	0.071	3.272	0.001**
Amount of catch	0.002	0.001	3.008	0.003**
<b><math>R^2</math> 0.452</b>				
<b>Adjusted <math>R^2</math> 0.408</b>				
<b>F Ratio 10.098</b>				

\*, \*\*, Significant at 1% and 5% P-value thresholds, respectively

#### 3.2.1. Age of Farmer

The age of the farmer positively and significantly affect income at 5% level of significance with coefficient of 0.004 and p value of 0.001. This implied that the income of the farmer increased by 4% as the farmers age increased by one year.

### 3.2.2. Fishing Experience

The fishing experience of the farmer positively and significantly affects income at 5% level of significance with coefficient of 0.014 and p value of 0.037. This implied that the income of the farmer increase by 14% as the farmers fishing experience increased by one year.

### 3.2.3. Distance Onshore

The distance to fishing site positively and significantly affected income at 5% level of significance with coefficient of 0.002 and p value of 0.010. This implied that the income of the farmer increase by 2% as the farmers move one more kilometer depth in the sea. It can be hypothesized that the farther away in the sea, the better the farmers' catch which could translate to more income.

### 3.2.4. Membership

The cooperative membership affected income at 5% level of significance with coefficient of 0.209 and p value of 0.023. This indicated that the income of the farmer increased by 21% as the farmers' cooperative membership increased by one year. This implies that being a member of cooperative could offers the farmer better remunerative prices for its product due to the benefits of collective bargaining which cooperative provides for its members.

### 3.2.5. Credit Access

Credit access affected income at 5% level of significance with coefficient of 0.231 and p value of 0.001. This implies that the income of the farmer increased by 23% as the farmer access to credit increased by one year. This result indicated that members of cooperative societies have easy access to credit facilities which helps farmers expand their businesses.

### 3.2.6. Amount of Catch

The amount of catch affected income at 5% level of significance with coefficient of 0.002 and p value of 0.003. This implies that income of the farmer increased by 2% as the farmers catch increased by one kilogram. This indicated that the more a farmer caught the more income he got from sales.

## 3.3. Profit Margin of Artisanal Fishing

The profit margin of artisanal fishing presented in Table 3 indicated the total average value of variable cost items of the enterprise is lower than the fixed cost items. The total variable cost accounted for ₦ 268,266.67 which is 38.66%, and the fixed cost accounted for ₦ 425,509.50 at 61.3 % of the total cost per fishing season. The fixed costs included the purchase of fishing boat which was ₦ 325,833.86 at 46.9% of the total cost, while fishing gear (casts net) was ₦ 82,658.34 at 11.9% of total cost. Basket and machete costs were ₦ 9,836.66 at 1.41% and ₦ 7,180.83 at 1.03%, respectively. Fixed items were depreciated over time. The variable costs included the cost of hired labour (₦ 52,800) which is 7.61% of the total cost, fueling of the fishing boat engine was ₦ 150,575 which is 21.7% of the total cost and boat repairs was ₦ 64891.67 which is 9.3% of the total cost. The total cost of fishing

was ₦ 693,776.17. The total revenue accrued from sales was ₦ 1,356,852.58 and the gross margin was calculated to be ₦ 1,088,585.91. The results indicated that fishing business in the study area is very profitable with a profit of ₦663,076.41. From the result the return on investment was 1.96 which indicates that on every ₦1 invested a profit of 96 k was made.

Table 3. Profit Margin of Artisanal Fishermen

FIXED ITEMS	Mean	Percentage (%)
Boat Purchase	325833.86	46.96527123
Fishing Gear	82658.34	11.91426624
Basket	9836.67	1.417844894
Machete	7180.833	1.035035983
<b>Total Fixed Cost</b>	<b>425509.50</b>	<b>61.33238909</b>
<b>VARIABLE ITEMS</b>		
Hired Labour	52800	7.610523723
Fueling	150575	21.70368579
Repairs	64891.67	9.3534014
<b>Total Variable Cost</b>	<b>268266.67</b>	<b>38.66761091</b>
<b>Total Cost</b>	<b>693776.17</b>	<b>100</b>
<b>Total Revenue</b>	<b>1356852.58</b>	
<b>Gross Margin</b>	<b>1088585.91</b>	
<b>PROFIT</b>	<b>663076.41</b>	
<b>%PROFIT</b>	<b>48.9</b>	
<b>Return on Investment</b>	<b>1.96</b>	

Source: Computed from Data Analysis, 2018.

The findings of Adewumi *et al* (2012) and Ipinmoroti *et al* (2018) reinforces the findings of this study that artisanal fishery is a profitable enterprise.

## 3.4. Constraints of Artisanal Fishing

The constraints to artisanal fishing in the study area are presented in Table 4. Given a multiples responses, the constraints were ranked according to the number of respondents that indicated them. Poor or low catch (56.7%) were the major constraint to artisanal fishing. The fishermen asserted that this constraint affects their income, thereby hindering business expansion. Inaccessibility to credit was the second ranked constraints (40.8%) perceived to limiting fishing in the study area. Also, 40% of the respondents indicated storms/ ocean tides resulting from heavy rainfall, high waves, thunder and lightning as another constraint to fishing in the study area. They reported that the severity of this constraint could result to boats damage. In the same vein, 29.2% complained of high cost of fishing gears which made it difficult for young fishers to join the fishing business. The least ranked constraints to artisanal fishing in the study area was incessant net loss

Table 4. Constraints to Artisanal Fishing

Constraints	Frequency	Percentage
Poor or low catch	68	56.7
Inadequate Credit Facilities	55	408
Storms/Ocean Tides	48	40.0
High Cost of Fishing Gear	35	29.2
Incessant Net Loss	25	20.8

Field Survey, 2018: \*Multiple Responses.

## 4. Conclusion

The study found that artisanal fishing is viable and profitable enterprise capable of providing employment opportunities in the rural communities. Government organs responsible for fishery development should promote the development of both artisanal and aquaculture so as to meet the fish demand supply deficit in Nigeria. This will generate supplementary income, diversification of livelihood activities and generation of employment opportunities as many people will return to full time fishing as against the current practice. The study recommends that credit facilities should be extended to practicing fishermen with liberal and relaxed conditions that would ease its accessibility thereby resulting in increased investment in the artisanal fishing and formulation of cooperatives should be encouraged among the fish farmers because it will enhance their bargaining power and provide them the opportunity to sell in more lucrative markets with high end returns that offer high prices for produce delivered and sold through the group.

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