Research Journal of
Applied Science
MEDWELL PUBLICATIONS

Analysis of Profitability of Small-Scale Fishing in Ondo State, Nigeria

Olusumbo Adeolu Adelaja, Roslina Binti Kamaruddin and Lee Wen Chiat
School of Economics, Finance and Banking, College of Business, Universiti Utara Malaysia, Malaysia

Key words: Small-scale fishing, gross margin, fishermen, profitability, food security, multiple regression

Corresponding Author:
Olusumbo Adeolu Adelaja
School of Economics, Finance and Banking, College of Business, Universiti Utara Malaysia, Malaysia

Page No.: 57-64
Volume: 15, Issue 2, 2020
ISSN: 1815-932x
Research Journal of Applied Sciences

Abstract: This study investigates the cost and return of small-scale fishing along coastal areas of Ondo state, Nigeria. Multi-stage sampling technique was used to select 400 small-scale fishermen from 20 viable fishing communities along coastal areas of Ondo state using structured questionnaire. Analysis of data collected was done with the use of descriptive statistics and gross margin analysis. The largest fixed and variable assets were outboard engine 88.32% and fuel 67.16%. Gross margin analysis indicates that small-scale fishing is profitable in the study area gross margin in Nigerian Naira (N) N1, 261, 476.60 k/fisherman/year (N105, 123.05/fisherman/month) Benefit Cost Ratio (BCR) Rate of Return on Investment (RORI) Gross Revenue Ratio (GRR) Net Profit Margin (NPM) and Expense Structure Ratio (ESR) were 1.29, 0.29, 0.77.0.23 and 0.11, respectively. The multiple regression result shows the coefficient determination, R^2 value of 0.721 shows that 72.1% of the output of fish level was determined by size of fishing boat, outboard engine, fishing nets and fuel. Constraints faced by small-scale fishermen in the study area include lack of infrastructural facilities, poor road networking system and lack of credit facilities. In conclusion, government should provide access to credit facilities at an affordable interest rate and storage facilities to ensure good quality fish.

INTRODUCTION

Agriculture has been the foundation of the country's economy through provision of food, foreign exchange, job opportunities and poverty eradication years back in Nigeria[1]. Agriculture still contributes its role in Nigeria's economy through Gross Domestic Product (GDP 20.24% as at 2014) even though the sector has been neglected to oil since, 1970's due to discovery of oil[2]. As a result of problem faced due to low agricultural production, especially, animal protein and current decline in recent international oil price and its product, Nigeria is faced with no other choice than to diversify into agriculture and other viable sectors in other to move its economic activities forward and reduce its dependency on oil sector. Food and Agricultural Organization (FAO) report stated that the current consumption of fish in Nigeria is 7.5 k per person which

is opposing global fish consumption of 18.7 k per person. This simply shows that the current deficit of fish consumption in the country is 11.2 k per person[3]. In Nigeria, the sector which the country can invest on is agriculture, mainly the small-scale fisheries sub-sector. Nigeria which has a total population of over 190 million people is richly blessed with natural resources and consist of about 14 million ha of inland water bodies which is fished by the small-scale fishermen. It also consist of about 900 km coastline with 42,000 km^2 total flat area of rock. Fishery is an integral part of agricultural sector which contributes significantly 4% to Gross Domestic Product (GDP). It sustains a stable contribution of 3.5-5% to total GDP in 2008-2013 but dropped drastically to 0.48% to the agricultural GDP while Agriculture contributes 20.24% to GDP[4, 5].

Nigeria fisheries sector is made up of small-scale/artisanal fisheries, industrial fisheries and aquaculture which all of them contributes to the local fish production at 80, 25.7 and 5.5%, respectively[6, 7]. Still, the production level in the subsectors are unable to meet up with fish demand due to increase in population and outdated equipment used by the small-scale fisheries. This resulted to high fish importation which has impact on the trade profit of the country's economy[3]. World Development Report indicated that the growth in production level of fisheries sector can be realized by appropriate technology which will reduce poverty and improve food security in the country. Similarly, development of small-scale fisheries can be reached by provision of infrastructural facilities in the rural fishing communities[8, 9]. Fish production is achieved in small-scale fisheries mainly by small group of people or individual using labour intensive gears. Small-scale/ artisanal fishers are characterized among the poorest people due to the use of traditional fishing equipments such as hook and line, throw nets, basket traps, long lines, set gillnets, purse seines, drag nets and wooden canoes with or without outboard engine ranging from 15 and 40 h power yamaha. They operate within 20 m depth within the shore waters and around 40 km distance from the coast[10-12].

Nigerian small-scale fisheries provides over 10 million job opportunities for people living along the coastal areas, offers over 40% source of animal protein consumed by Nigerians, income generation (improve standard of living) rural development and generate Foreign exchange yearly to the country[13-14]. According to Central Bank of Nigeria[15] report fisheries sector generates around 20 million dollars yearly through shrimps exportation. Similarly report stated that around the world especially in developing countries, small-scale fisheries support millions of fishers and play significant part in eradication of poverty, food security and conservation of biodiversity in coastal communities[16, 17]. The major vocation of people in the riverine and coastal communities is fishing and they so much depend on it for their source of living. Despite the water resources found in abundance, the country depend on fish importation to cater for the fish requirement needed.

Gross margin measures the profitability level of a business after deduction of cost incurred from total sales revenue. Profitability can be defined as the monetary reward gotten by the fishermen from sales of fish and its product. The main goal of every business is to make profit. Profit realized by the fishermen is as a result of fishermen's decision for venturing into fisheries activities this will also leads to embraced of technologies if fishing operations are profitable[18]. Despite the relevance of small-scale/artisanal fisheries to the country's economy, only few studies have been done to assess the cost and return of the fishing enterprise and problems faced by the fishermen. Few studies have been carried out on cost and return of small-scale fishing. This study is required in other to determine if the fishing business is viable to encourage the government to allocate capital for the development of the sub-sector. The objectives of this study were to describe the socio-economic characteristics of the small-scale fishers determine the cost and return of small-scale fishing and identify the problems faced by small-scale fishers in the study area.

MATERIALS AND METHODS

Study background Ondo state, Nigeria: Coastal areas of Ondo state lies on Latitude 50 50'N-60 09'N and Longitude 40 45'E-50 05'E. Ondo state is located in South-West of Nigeria consisting of around 80 km shoreline from Northwest to southeast direction[19]. The state is a maritime state and was categorized among the top fish producers in the country due to over 50 fishing communities along its coast. Ilaje local government area (ILGA) is the coastal area of Ondo state dominated by over 50 settlements spread along the coast[20]. It shares borders with Ekiti and Kogi states in the North; Osun and Ogun states towards the west; Edo and Delta state on the eastern part while the Southern part is Atlantic Ocean and covers area of about 1, 318 km^2 [21]. Producers of fish are majorly found in the in the fishing communities along the coastline and are majorly Ilajes. The males (husband and male children) are majorly the fishermen while the females (wives and female children)

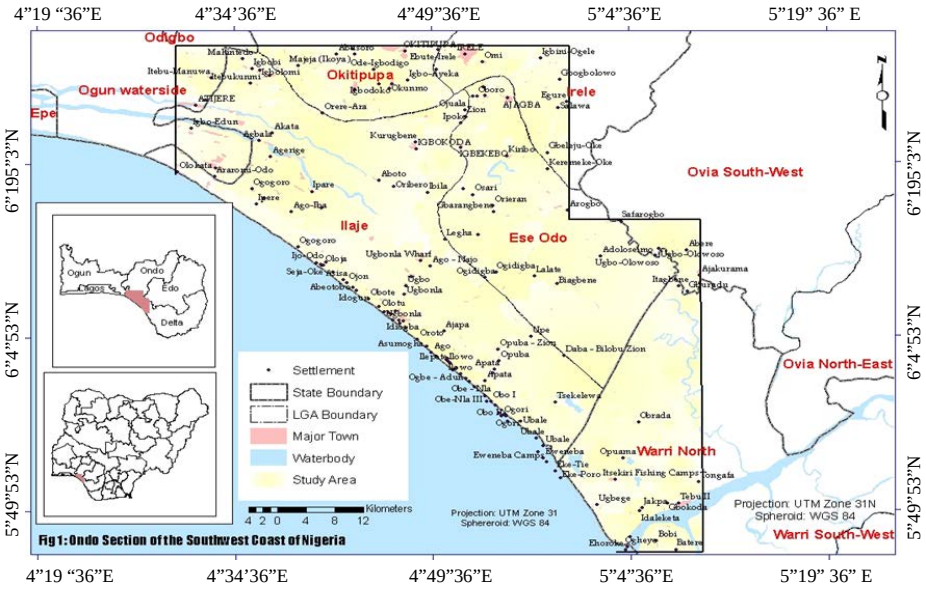

Fig. 1: Map showing the fishing communities along the coastal areas of Ondo state, Nigeria

are the processors[22]. The area is one of the most important fishing areas in the coast due to rich biodiversity of fin fish and shell fish. Figure 1 shows some of the fishing communities along the coastal areas of Ondo state located in Ilaje axis such as Aberoyo, Abereke, Igho, Udigun-Nla, Ojumole, Ikorigho, Aiyetoro, Jinrinwo, Araromi, Ogboti, Araromi sea-side, Enuamo, Okesiri, Erunna Ero, etc.

Sampling size and data analysis: The study was carried out along coastal areas of Ondo state, Nigeria. Primary data was used via. structured questionnaire for the collection of information in the study area. Purposive sampling method was used to select 20 viable fishing communities while 21 small-scale fishermen were simple randomly selected from each of the 20 fishing communities to give a total sample size of 420 respondents. However, due to inadequate information provided by the fishermen, 20 copies of the questionnaire were discarded and data provided by 400 respondents were used for the analysis. This is in line with[23] who stated that case can be dropped were missing information is above 50%. Data provided were analyzed using descriptive statistics such as frequency and percentage to describe the socioeconomic characteristics of small-scale fishermen and identify the constraints faced by small-scale fishermen while gross margin was used to determine the cost and returns of small-scale fishing and profitability ratios as presented in Eq. 1-7. Also, Cobb-Douglas function equation was used to determine the factors influencing some demographic factors of the fishermen on the gross margin as indicated in Eq. 8. Gross margin analysis for the cost and returns is given as follows:

$$\text{Gross Margin (GM)} = \text{TVP-TVC} \quad (1)$$

$$\text{Net Income (NI)} = \text{GMI-TFC} \quad (2)$$

$$\text{Benefit Cost Ratio (BCR)} = \text{TR/TC} \quad (3)$$

$$\text{Rate of Returns on Investment (RORI)} = (\text{NI/TC})\times 100 \quad (4)$$

$$\text{Net Profit Margin (NPM)} = \text{NI/TR} \quad (5)$$

$$\text{Gross Revenue Ratio (GRR)} = \text{TC/TR} \quad (6)$$

$$\text{Expense Structure Ratio} = \text{FC/VC} \quad (7)$$

Where:
TVPL = Total Value of Product/total revenue
TVC = Total Variable Cost
TFC = Total Fixed Cost
NI = Net Income

Depreciated value of fixed items were used for calculation. Depreciation was calculated using a Straight Line Method (SLM) which assumed salvage value of zero:

$$DS = (OC\text{-}SV)/L \quad (8)$$

Where:
DS = Annual depreciation
OC = Original Cost
SV = Salvage Value
L = Expected or Useful Life Span (Years)

Multiple regression model was employed to determine the demographic factors influence on the level of fish output. The model is specified as follows:

$$Q = f(X1, X2, X3, X4, X5, e)$$

Where:
Q = The fish output value in naira
X1 = Represents the fishing boat measured in metres
X2 = Represents the cost outboard engine used in fish production
X3 = Represents the cost of fishing nets in naira
X4 = Represents the cost of accessories in naira
X5 = Stands for the cost of fuel in naira
e = Error term

B_0 = intercept, B_1-B_5 = regression parameters to be estimated and e = error terms. Statistics such as the explanatory power of the model (R^2), the significance of the estimated coefficient, the magnitude of the estimated coefficient were used to describe result of the regression model.

In order to get information on constraints faced by small-scale fishermen, a 4-point likert scale was used to rate the items accordingly. The scores were weighted and mean value of 2.5 was used to accept or reject an item as a constraint faced by small-scale fishermen in the study area.

RESULTS AND DISCUSSION

Socioeconomic characteristics of the respondents: Descriptive results for the respondent's demographic factors are summarized in Table 1. Frequency and percentage was used for the interpretation of the result for each variable while mean and standard deviation was provided for numeric values. Table 1, all of the respondents were male adults aged ranging from 20-50 years. Most 57.2% of them fall within the age range of 31-40 years while small percentage were above 50 years. Mean age is 39 years from the findings. In other words, the result indicated that respondents are in their active age range and fishing is dominated by the youth. Apparently, this is due to difficulties in fishing operations which takes hours and some have to go fishing at night. This findings was similar to[24] who carried out a survey of fishermen in Kenya and discovered that fishermen fell within the age bracket 21-45 years.

Table 1: Demographic factors of respondents (n = 400)

Variables	Frequency	Percentage
Age (years)		
<20	0	0.0
20-30	32	8.0
31-40	229	57.2
41-50	132	33.0
Above 50	7	1.8
Mean±SD	**38.60±5.64**	
Sex		
Male	400	100.0
Female	0	0.0
Religion		
Christianity	400	100.0
Islam	0	0.0
Traditional	0	0.0
Marital status		
Single	5	1.3
Married	391	97.8
Divorced	1	0.3
Widowed	3	0.8
Tribe		
Hausa	0	0.0
Igbo	0	0.0
Yoruba	400	100.0
Household size		
<6	108	27.0
6-10	288	72.0
Above 10	4	1.0
Mean±SD	**6.45±1.44**	
Educational qualification		
No formal education	13	3.3
Primary education	144	36.0
Secondary education	243	60.7
Fishing experience (Years)		
<10	88	22.0
10-15	80	20.0
16-20	112	28.0
21-25	62	15.5
Above 25	58	14.5
Mean±SD	**17.61±6.82**	
Other sources of income aside fishing		
Yes	176	44.0
No	224	56.0
If yes, state other source of income		
Boat building	21	11.9
Farming	75	42.6
Repair of out-board engine	34	19.3
Tailoring	8	4.5
Transportation	38	21.6
Member of fish association group		
Yes	330	82.5
No	70	17.5
Access to credit facilities		
Yes	255	63.8
No	145	36.3
Any form of fish training		
Yes	372	93.0
No	93	7.0
Fishing trips/week		
4 times	46	11.5
5 times	254	63.5
6 times	100	25.0

Table 1: Continue

Mean+SD	**5.14 +0.63**	
Duration of fishing trip (h)		
10	13	3.3
11	55	13.7
12	176	44.0
13	136	34.0
14	20	5.0
Mean±SD	**12.24±0.87**	

**USD$1 = N360 (Nigerian Naira) by 2017 exchange rate, field survey, 2017

This age range is majorly considered as productive and economically active. All 100% the respondents were males, christians and yoruba speaking people by tribe. This is in agreement with[25] who carried out research on shrimp fishermen in the study area. Similarly[14] reported that fishing is dominated by males in Kwara state. Based on the result, it shows that fishing is mainly done by males while the females engaged in processing of fish in the study area. This was in support with[26,27] and Nguvava (2013) findings who stated that fishing was conducted by men. Findings by Tesfay and Teferi[28] stated that about 95% of the fisher folks were males. Almost 98% of the fishermen were married which shows that they have more hands to assist in the fishing activities. Result shows that majority 72% of respondents household size fell within the range of 6-10 people while the mean value gives 7 people per house hold.

With respect to education, findings show that majority 60.7% of the respondents had secondary education, 36% had primary education while 3.3% had no formal education. Based on their educational status, it may inspire the acceptance of improved fish handling practices. According to Nguvava[27], educated personnel could use appropriate fish handling practices during fishing reducing post-harvest fish losses and quality improvement. From the result, 28% of the respondents had fishing experience within 16-20 years, 20% had below 10 years while the mean value indicated 17 years. 53% of the respondents said they do not have any other source of income aside fishing while 47% said they have other sources of income. Majority (42.6%) of the respondents were into farming while 11.9% were into boat building as other sources of income. Results show that 82.5% of respondents belong to fish association group while 17.5% do not belong. Despite being a member of fish association, the fishermen have not been benefiting from any assistance from the government. Majority (93%) of the fishermen indicated they had one form of fish training while 17% do not have any form of fish training. The mean value of fishing per week indicates that majority of the fishermen goes for fishing activities for 5 days in a week for an average of 12 h fishing duration in the study area.

Table 2: Economic analysis and profitability ratios of small-scale fishing in Ondo State

Items	Amount in Naira (N)	Total cost %
Fixed cost		
Fishing boat	12,333.75	3.95
Outboard engine (40 horse power)	275,700.00	88.32
Fishing nets	12,327.50	3.94
Accessories (floats, sinks and hooks)	11,892.50	3.80
Total fixed cost	312,163.80	100
Variable cost		
Fuel	1,927,125.00	67.16
Oil	360,360.00	12.56
Lubricant	166,500.00	5.80
Food (For crew)	118,080.00	4.11
Repair and Maintenance	156,000.00	5.44
Miscellaneous expenses	141,600.00	4.93
Total variable cost	2,869,665.00	100
Total cost	3,181,828.80	
Total revenue	4,131,142.00	
Gross margin	1,261,476.60	
Net income	949,312.80	
Benefit Cost Ratio (BCR)	1.29	
Rate of Revenue on Investment (RORI)	0.29	
Gross Revenue Ratio (GRR)	0.77	
Net Profit Margin (NPM)	0.23	
Expense Structure Ratio (ESR)	0.11	

**USD$1 = N360 (Nigerian Naira) by 2017 exchange rate, field survey, 2017

Profitability ratios of small-scale fishing in Ondo state, Nigeria: The results of cost and return analysis of small-scale fishing is presented in Table 2. In the study area, there are fixed and variable costs incurred in small-scale fishing. Fixed costs include the depreciation costs of fishing boats, outboard engine, fishing nets and accessories used while variable costs include fuel, oil, lubricant, food, repair and maintenance and miscellaneous. Depreciation costs of the fixed items indicates fishing assets loss in value due to usage in one production year. Average total cost incurred by the fishers annually is N3,181,828.80. The largest percentage of total fixed cost annually 88.32% is the outboard engine with a depreciation cost of N275,700.00 followed by fishing boat 3.95%. For effective fish production in the study area, results shows that outboard engine, fishing boat and fishing nets were the most critical items of fixed costs. This is in agreement with Inoni and Oyaide[29] study on socioeconomic analysis of artisanal fishing in Delta state and discovered that boat/canoe and outboard engine are the critical assets to enhance fish production. In small-scale fishing, total variable costs used solely depend on the fishing effort by the fishers. Fishing effort can be defined as sum of fishing trips carried out alongside with fishing power to capture fish during a given period[30]. Variable costs is determined by production capacity and the average annual variable cost in the study area is N2,869,665.00. The largest percentage of annual

variable cost is fuel 67.16% followed by oil 12.56% used along with the fuel and lubricant 5.80% are considered as critical variable cost in the study area. Inoni and Oyaide [29] reported that fuel alone contributes between 60-71% of annual variable costs. Gross margin analysis value of N1,261,476.60 per fishermen per year in the study area shows that small-scale fishing is profitable. This is in agreement with Inoni and Oyaide[29, 14] findings that artisanal fishing is profitable in Delta and Kwara states, respectively.

From the profitability ratios, Benefit Cost Ratio (BCR) is used as one of the method of evaluation of project. According to Olagunju *et al*.[31] rule of thumb says that any business with BCR value greater than one indicates profit. Outcome of this result compares favorably with research of Inoni and Oyaide[29] and Adewumi *et al*. who observed that small-scale/artisanal fishing is a viable business. Since, the value of BCR is 1.29, this implies that small-scale fishing in Ondo state is profitable. Higher value of BCR will occur if capital, sophisticated fishing equipments and labour are provided. The Rate of Returns on Investment (RORI) simply shows that for every one naira invested in the business, N0.29 was gained and Gross Revenue Ratio (GRR) of 0.77 specifies that for every one naira return to small-scale fishing, 77 kobo is being spent. The RORI value shows very low operating margin in small-scale fishing in Ondo state this is as a result of high cost of production incurred in the study area. The result shows that 27% of profit was realized on an average from gross revenue. Similarly, 0.77 value of GRR indicates that there is an increase in variable costs or revenue realized is reducing as a result of decrease in fish price. The findings is also in consistent with Inoni and Oyaide who also confirm that small-scale fishing is cost-effective. Espense Structure Ratio (ESR) is 0.11 which denotes that 11% of the total cost is comprised of fixed cost element. This shows that small-scale fishing business is valuable since high production with variable cost will lead to increased total revenue while the fixed cost remains unchanged.

Multiple regression result: The regression analysis was carried out to determine the factors influencing output of fish level in the study area. Double logarithm was chosen as the lead equation based on statistical criterion and the results is presented in Table 3. The multiple regression result revealed that the output of fish level is significantly determined by fishing boat, outboard engine, fishing net and fuel. The coefficient values are in line with the apriori expectation. Therefore, the more the amount spent on outboard engine, fishing net, fishing boat and fuel, the more amount realized from the small scale fishing in the study area. The result is in agreement with the findings by Inoni and Oyaide[29] and Adewumi *et al*.[14]. The result suggests the need for small-scale fishermen to get more of these fishing equipments to increase their level of revenue from fishing. Equally, policies that will make provision for these inputs for fishermen should be put in place at an affordable price. Positive relationship between the fish output and outboard engine shows that good outboard engine will make the small-scale fishermen to go far and catch more fish which increase their output level. Table 3 shows that fishing boat, outboard engine and fishing nets were significant at 5% with the output of fish level. The null hypothesis is rejected while alternative hypothesis is accepted. The R^2 value of 0.721 indicates that 72.1% of the output level of fish is determined by the independent variables. The coefficient values, β values, t-stat and the level of significance for each of the independent variables were stated in Table 3.

Constraints encountered among small-scale fishermen in Ondo state, Nigeria: Table 4 presents the numerous constraints faced by small-scale fishermen their weighted scores and weighted means. From the findings carried out, the most critical constraints faced in the study area were lack of electricity, lack of storage facilities, oil spillage, lack of good roads, inadequate and high fuel price, lack of spare parts for their outboard engines, lack of access to credit facilities, high cost of outboard engines, lack of health centres, inadequate provision of good schools (secondary), lack of good water and high cost of lubricant. All these factors have been revealed to reduce production output and also increase production cost incurred in the study area. Only recreational facilities was not seen as a constraints in the study area. Therefore, an urgent intervention is needed to provide small-scale fishermen with easy access to good roads, supply of electricity, reduction of oil spillage, provision of fuel at a reduced price, provision of outboard engine and spare parts an affordable price, provision of lubricant at a reduced price to enhance their level of production.

Similarly, provision of health centres, provision of good source of water and good educational system will help to improve their health condition and acquire knowledge. Government intervention is highly needed on supply of electricity to reduce post-harvest fish losses and improve the fish quality as this item as the highest weighted mean score of 3.99 resulting as the major constraints faced by the small-scale fishermen in the study area. Provision of storage facilities would improve their fish quality increase income level and the small-scale fishermen will be encouraged to increase the number of fishing trips. This is in agreement with Adewumi *et al*. [14] that provision of storage facilities is essential in artisanal fisheries sector. Oil spillage is also rated as one of the major constraints faced by the fishermen. Government and fisheries department should guide

Table 3: The regression result of the factors influencing output of fish level in the study area

Variable	Coefficient	β	t-stat	Significant
Constant	4.236	0.132	3.582	0.000*
Fishing boat	1.284	0.217	2.347	0.003**
Outboard engine	0.352	0.231	1.972	0.001**
Fishing nets	1.342	0.172	2.142	0.023**
Accessories	0.142	0.162	1.723	0.540
Fuel	0.193	0.206	2.243	0.000**
R2	0.721			
F stat	6.062 sig 0.000*			

*Significant at 1%, **Significant at 5%, computed from field survey data 2017

Table 4: Percentage distribution of the constraints faced by small-scale fishermen

Constraints	Mean value	Minimum	Maximum
Lack of good roads	3.96**	1	4
Lack of electricity	3.99**	1	4
Lack of good water	3.75**	1	4
Inadequate provision of good schools (secondary)	3.64**	1	4
Lack of health centers	3.70**	1	4
Recreational facilities	2.25*	1	4
High cost of outboard engines	3.86**	1	4
Lack of spare parts for their outboard engines	3.91**	1	4
Lack of storage facilities	3.98**	1	4
Inadequate and high fuel price	3.96**	1	4
Lack of access to credit facilities	3.64**	1	4
High cost of lubricant	2.75**	1	4
Oil spillage	3.96**	1	4

Field Survey, 2017; Decision rule: Critical mean = 2.5, **Mean accepted as a constraints, *Mean not accepted as a constraints

against oil companies causing oil spillage by setting down rules and regulations governing the usage of the natural resources. Similarly, credit facilities should be made available for the small-scale fishermen in other to be able to afford good fishing equipments.

CONCLUSION

In this study, we contributed to the literature on the cost and return of small-scale fishing by fishermen in Ondo state, Nigeria which has the longest coastline (180 km) in Nigeria where fishing activities is very high. Our results indicate that small-scale fishing is dominated by males who are still economically active based on their mean age. More importantly, our results confirm that small-scale fishing is profitable based on the Benefit Cost Ratio (BCR) which is >1 and other profitability ratios (ROR, NPM and ESR) measured. The rule of thumb state that for any business with BCR value >1 indicate that the business is profitable and can be ventured into. Moreover, significant relationship exist between fishing boat used, outboard engine used, fishing nets and fuel with the output level of fish.

The role of small-scale fisheries sub-sector to the economy in terms of provision of job opportunities, food security and generation of income and foreign exchange cannot be ignored. Nevertheless, the continuity of small-scale fishing among the fishermen should be enhanced by forming cooperatives in other to have access to credit facilities at an affordable interest rate, provision of infrastructural facilities, supply of modern fishing equipments and setting down regulations governing management of the fisheries resources. This will reduce the poverty level in the fishing communities and improve their standard of living. Government should embark on construction of good road network and cold rooms for preservation of their fish products to reduce post-harvest fish losses in the fishing communities.

REFERENCES

01. CBN., 2003. Central bank annual report and statement of account. Central Bank of Nigeria, Abuja, Nigeria.
02. Tiamiyu, S.A., O.J. Olaoye, O.R. Ashimolowo, E.O. Fakoya and W.G. Ojebiyi, 2015. Benefits derived from national fadama development project II by fish farmers in Lagos State, Nigeria. Int. J. Fisher. Aquacult., 7: 54-61.
03. FAO., 2013. FAO Country Programming Framework (CPF) federal republic of Nigeria. Food and Agriculture Organization of the United Nations, Rome, Italy. http://www.fao.org/3/a-au053e.pdf.
04. NTWG., 2009. A report of the vision 2020 of the national technical working group on agriculture and food security. National Technical Working Group-NTWG, USA.
05. Anonymous, 2016. Nigeria fishery statistics-summary report. Fisheries Committee for the West Central Gulf of Guinea-FCWC-FISH/CPCO-PECHE, Ghana. https://www.fcwc-fish.org/fisheries/statistics/nigeria/901-nigeria-fishery-statistics-2016-summary-report

06. Faturoti, O., 2010. Fisheries contribute N126: 4Billion to Nigerian economy. Federal Ministry of Agriculture and Rural Development (FMARD), Nigeria.
07. FDF., 2013. Nigeria Fish Supply by Subsectors: Fisheries Statistics of Nigeria (2005-2013). 4th Edn., Federal Department of Fisheries, Nigeria, Pages: 50.
08. FAO., 2010. Fisheries and aquaculture topics: Food security and fisheries. Topics Fact Sheets. Text by Peter Manning, FAO Fisheries and Aquaculture Department, Rome.
09. Lokuruka, M.N.I., 2016. Food quality perspectives in African fish products: Practices, challenges and prospects. Intl. J. Fish. Aquacult. Sci., 6: 15-32.
10. Mathew, S., 2003. Small-Scale Fisheries Perspectives on an Ecosystem-Based Approach to Fisheries Management. In: Responsible Fisheries in the Marine Ecosystem, Sinclair, M. and G. Valdimarsson (Eds.). Food and Agriculture Organization of the United Nations, Rome, Italy, ISBN:0-85199-633-7, pp: 47-64.
11. Anene, A., C.I. Ezeh and C.O. Oputa, 2010. Resources use and efficiency of artisanal fishing in Oguta, Imo State, Nigeria. J. Dev. Agric. Econ., 2: 94-99.
12. Bangura, P., 2012. Fish production, livelihoods and environmental challenges in some coastal communities of Nigeria and Sierra Leone. MSc Thesis, Federal University of Agriculture Abeokuta, Abeokuta, Nigeria.
13. Adepegba, O.B., 2007. Improving fish processing and marketing in Nigeria. Proceedings of the National Stakeholders Workshop on Inland Capture Fisheries Development, February 20-22, 2007, Women Development Centre, Kaduna, Nigeria, Pages: 1-23.
14. Adewumi, M.O., O.E. Ayinde, A.H. Adenuga and S.T. Zacchaeus, 2012. The profitability analysis of artisanal fishing in Asa River of Kwara state, Nigeria. Intl. J. Dev. Sustainability, 1: 932-938.
15. Central Bank Nigeria, 2002. Annual Report and Statement of Account. Central Bank of Nigeria, Abuja, Nigeria, pp: 2-5.
16. Delgado, C.L., N. Wada, M.W. Rosegrant, S. Meijer and M. Ahmed, 2003. Fish to 2020: Supply and demand in changing global markets. WorldFish Center Technical Report 62, International Food Policy Research Institute, Washington, DC. and WorldFish Centre, Penang, Malaysia.
17. Chuenpagdee, R., 2011. World Small-Scale Fisheries: Contemporary Visions. Eburon Academic Publishers, Netherlands, ISBN: 978-90-5972-539-3, Pages: 400.
18. Carlos, F.O., 2001. Financial profitability model for agricultural and agro-industry. Rural Finance and Investment Learning Centre, USA. http://www.ruralfinanceandinvestment.org/node/84.
19. Akinwumi, F.O., I.O. Akinwumi and O.A. Ogundahunsi, 2011. Characterization of artisanal fishery in the coastal area of Ondo State, Nigeria. Intl. Res. J. Agric. Sci. Soil Sci., 1: 83-89.
20. Adebowale, K.O., F.O. Agunbiade and B.I. Olu-Owolabi, 2008. Impacts of natural and anthropogenic multiple sources of pollution on the environmental conditions of Ondo State Coastal water, Nigeria. Electron. J. Environ. Agric. Food Chem., 7: 2797-2811.
21. Fapounda, O.O., 2005. Analysis of bio-technical and socio-economic factors affecting agricultural production in Ondo State Nigeria. Ph.D Thesis, Federal University of Technology Akure, Akure, Nigeria.
22. Adeparusi, E.O., A.I. Ajibefun and E.O. Akeremale, 2003. Smoke-curing of fish by artisanal fisher folks in Ilaje, Ondo State, Nigeria. ASSET Series A, 3: 101-109.
23. Hair, J.F., W.C. Black, B.J. Babin and R.E. Anderson, 2010. Multivariate Data Analysis: A Global Perspective. 7th Edn., Pearson Education Inc., Upper Saddle River, NJ., USA., ISBN-13: 9780135153093, Pages: 800.
24. Mungai, D.M., 2014. Assessment of post-harvest losses of nile perch (Lates niloticus) incurred by fishermen from Lake Victorla, Kenya. Ph.D Thesis, Kenyatta University, Kenya.
25. Akinbote, R.E., 2016. Assessment of the production and management of economically important shellfish resources of the coastal waters of Ondo state, Nigeria. Ph.D Thesis, Federal University of Agriculture Abeokuta, Abeokuta, Nigeria.
26. Akande, G. and Y. Diei-Ouadi, 2010. Post-Harvest Losses in Small-Scale Fisheries: Case Studies in Five Sub-Saharan African Countries. Vol. 550, Food and Agriculture Organization of the United Nations, Rome, Italy, ISBN:9789251066713, Pages: 72.
27. Nguvava, J.P., 2013. Effects of post-harvest handling on quality and sensory attributes of sardines: A case study of Musoma district. Ph.D Thesis, Sokoine University of Agriculture, Morogoro, Tanzania.
28. Tesfay, S. and M. Teferi, 2017. Assessment of fish post-harvest losses in Tekeze dam and Lake Hashenge fishery associations: Northern Ethiopia. Agric. Food Secur., 6: 1-12.
29. Ironi, O.E. and W.J. Oyaide, 2007. Socio-economic analysis of artisanal fishing in the south agro-ecological zone of Delta state, Nigeria. Agric. Trop. Sub-Trop., 40: 135-149.
30. FAO., 2004. Socio-Economic Analysis and Policy Implications of the Roles of Agriculture in Developing Countries. Food and Agriculture Organization, Rome, Italy,.
31. Olagunju, F.I., I.O. Adesiyan and A.A. Ezekiel, 2007. Economic viability of cat fish production in Oyo State, Nigeria. J. Hum. Ecol., 21: 121-124.