

1                   **VALUE CHAIN ANALYSIS OF ARTISANAL FISHING IN ILAJE**  
2                   **LOCAL GOVERNMENT AREA OF ONDO STATE, NIGERIA**

3   **Abstract**

4   *The demand for fish like all other animal proteins in Nigeria has surpassed the supplies leaving the*  
5   *general populace in sub-optimal protein consumption. In bridging this supply demand gap, Nigeria must*  
6   *explore her artisanal fisheries and aquaculture resources which have been found to be under-utilized.*

7   *Hence, value chain ~~analysis in artisanal fishing in the coastal area of Ondo States were~~analyses in*  
8   *~~artisanal fishing in the coastal area of Ondo States were~~ investigated.*

9   *Primary data were collected with the aid of a well-structured questionnaire. A purposive*  
10   *sampling technique was used to select four fishing communities in Ilaje local government, where*  
11   *35 (fishermen, processors and marketers) were each selected randomly from the communities.*

12   *Data were analyzed using Descriptive Statistics and Gross Margin Analysis.*

13   *The socioeconomic characteristic indicated that 68.6% of the fishermen, 77.2% processors and*  
14   *65.7% marketers were less than 50 years of age. The gender of the respondents revealed that all*  
15   *(100%) of the fishermen were male, 91.2 % processors and 97.10% marketers were female. The*  
16   *study also indicated that 62.9% of the fishermen has household greater than 4, the processors*  
17   *has 54.3% household size above 4 and 60% of the marketers have household size above 4. The*

18   *educational status of the respondents indicated that 94.3% of the fishermen ~~hashave~~ one form of*  
19   *education or the other, 77.1% of the processors have one form of education or the other and*  
20   *65.7% of the marketers were also educated. The study equally showed that all the marketers are*  
21   *into one association or the other. The budgeting analysis revealed that ~~a positive margin~~*  
22   *~~realized by the two categories of marketers were~~a positive margin realized by the two categories*  
23   *~~of marketers was~~ ₦300.54 and ₦1,866.00 per basket respectively and ~~a net returns~~a net return of*  
24   *1.04 and 1.30 respectively. The processors equally had a positive gross margin of ₦43.871.54*  
25   *and ~~a net returns~~a net return of 1.12. The most influential actor in the artisanal fish value chain*  
26   *were the marketers, this is because of the strong associations involved in this category, which*  
27   *prevent others from buying directly from the fishermen.*

28   **Keywords: Value Chain, Artisanal, Gross Margin, Analysis, Fishing.**

29   **Introduction**

30   Fishery production is significant to Nigerian economy in view of its importance in providing  
31   cheap source of food security, income, employment and serves as source of foreign exchange,

32 particularly those of the riverine communities (NBS 2016). The Fisheries sub-sector is an  
33 integral part of agriculture sector in Nigeria. It maintains a steady contribution of about 3.5 to 4%  
34 of total GDP between 2008 and 2012, translating to about 10% of total agricultural GDP, which  
35 itself contributed between 35 and 40 percent within the same period (Oladimeji *et al.*, 2013b).  
36 Fish supply is from four major source namely; artisanal fisheries, industrial trawlers, aquaculture  
37 and imported frozen fish (Akinrotimi, Abu and Aranyo, 2011). The Nigeria fisheries sector is  
38 made up of capture fisheries and aquaculture. Capture fisheries encompasses both marine and  
39 inland fisheries. Artisanal fisheries sub-sector remains the most important sector, it accounts for  
40 the major fish supply in the developing world (Ibrahim, et al., 2009)

41 Artisanal fisheries in Nigeria provided more than 82% of the domestic fish supply giving  
42 livelihoods to one million fishermen and up to 5.8 million fisher folks in the secondary sector  
43 (Fatureti, 2011). The total fish demand for Nigeria based on the 2014 population estimate of  
44 about 181million is 3.32million metric tons, while the domestic fish production from  
45 Aquaculture, Artisanal and Industrial fisheries for 2014 is 1.123million metric tons. Although,  
46 aquaculture production increased considerably over the years, from 152,796 metric tons in 2009  
47 to 221,128 metric tons in 2011 and 3.32 million metric tons in 2014. (NBS 2016).

48 The opportunity of bridging the widening demand- supply gap of fish in Nigeria through  
49 domestic production offers a great investment potential to the Nigerian populace and also the  
50 inflow of foreign direct investment into the country.

51 The Niger Delta region contributes more than 50% of the entire domestic Nigerian fish supply.  
52 This is as a result of abundance of both fresh, brackish and marine water bodies that are  
53 inhabited by a wide array of both fin fish and non-fish fauna that supports artisanal fisheries.  
54 Nigeria has a great potential of fish resources whose distribution and value chain needs to be  
55 strengthened and developed to bridge the gap between demand and supply of fish in Nigeria.  
56 According to (Adeleke, 2013), the acceptability of fish in most communities of the world is due  
57 to fish high digestibility compared to beef, mutton, chicken and bush meat. (Adeleke, 2011) also  
58 observed that fish consumption is free from taboos as is the case for most meat products.  
59 Artisanal fisheries are important and contributed at least 40% of fish production from all sources  
60 in Nigeria between 1995 and 2008 (FAO, 2010). Artisanal marine fisheries provide essential

**Comment [M1]:** Follow the Author's guide of referencing. Every reference referred in the text must also present in the reference list and vice versa. In the text, citations should be indicated by the reference number in brackets [3] Do it for all your citation within the text.

61 source of sustenance, employment and financial well-being for coastal populations of developing  
62 countries (Andrew et al., 2012)

63 Fish is highly susceptible to deterioration without any preservative or processing measures  
64 (Okonla and Ekelemu, 2015). Immediately fish dies, numbers of physiological and microbial  
65 deterioration sets in, this invariably degrades the quality of fish (Eyo, 2001). The deterioration  
66 that sets in makes it unfit for human consumption within about one day of capture, unless it is  
67 subjected to some form of processing, particularly if traditional methods have been pro-used,  
68 thus, subjecting the fish to many forms of loss and spoilage. Fish being a highly perishable  
69 substance needs to be transported to the consumer who is the final user on time to avoid post-  
70 harvest spoilage through a coordinated marketing channel.

71 Value chain refers to all activities necessary to bring a product or service from conception,  
72 through the different stages of production, distribution to final consumption and final disposal  
73 after use (Kapslinky and Morris, 2000, Adeoye et al, 2013). Value chain promotion is an effective  
74 way of encouraging rural-urban linkages and the perception provides a useful analytical  
75 background for market and sub-sector analysis. Value chain analysis is the process of breaking a  
76 chain into its constituent parts so as to have a better understanding of its structure and  
77 functioning parts.

78 The analysis of value chain involve identifying chain actors and discerning their functions;  
79 identifying value added in the chain and assigning costs to those activities (United Nation  
80 Industrial Development Organization 2009).

81 Files (2007) posited that value chain analysis is essential for understanding markets, their  
82 relationship, the participation of different actors, and the critical constraints that limit the growth  
83 of livestock (fish) production and consequently the competitiveness of small holders' farmers.  
84 These farmers currently receive only a small fraction of the ultimate value of their output, even  
85 if, in theory, risk and reward should be shared down the chain. In agriculture they can be thought  
86 of as a farm to folk' set of processes and flows. Artisanal fish value chain analysis looks at every  
87 step, a fisheries business goes through, from captured fishes to the eventual end user. The goal is  
88 to deliver maximum value for the least possible total cost.

89 Value chains in artisanal and aquaculture fisheries differs and composed of several nodes the  
90 products pass through before meeting the consumers. Moreover, fishery value chain can be  
91 defined as interlinked value-adding activities that convert inputs into outputs, which in-turn add  
92 to the bottom line and help to create competitive advantage.

93 However, Fish value chains in Nigeria are not yet developed to meet international market  
94 requirements as limited value addition is done in the industry, with the result that market for fish  
95 and fish products are limited to domestic markets (Investopedia, 2011), and the eagerness to raise  
96 immediate income from fish harvest. Actors in the chain comprises of the fishermen, (fish  
97 collector) marketer and processors.

98 The ability to make fish relevant in the market is to ensure the flow of fish and fish product from  
99 the artisanal fisherman to the consumers in the form, time and place that will be convenient. This  
100 involves the participation of some actors along the fish distribution channel especially the  
101 middlemen. (Lawal and Idega, 2004). According to (Adekanye, 1988), marketing is a method  
102 used to bring the interpersonal forces of demand and supply together irrespective of the location  
103 of the market. The different criteria used in sales of fish depend on efficiency with which the  
104 marketing system transmits information among the fish mongers or marketers and thus, prices of  
105 fish changes as it passes through middlemen such that by the time it finally get to the consumers,  
106 it becomes expensive (Dolapo, 2011).

107 This study is imperative because, most research work in the study area focus mainly on artisanal  
108 fishing and marketing, while the areas of value chain / value addition were uncovered. It is in the  
109 light of this that the research has been conceptualized to analyze value chain in artisanal fishing  
110 in the coastal area of Ondo State.

#### 111 **Objective of the Study**

112 The main objective of the study is to analyze value chain in artisanal fishing production in the  
113 coastal area of Ondo States of Nigeria,

114 The specific objectives are to:

- 115 i. ascertain or determine the socio-economic characteristics of the actors in the fish value  
116 chain;

- 117 ii. identify the major players (actors) in artisanal fish value and;  
118 iii. estimate the profit margin along the identified fish value chain;  
119 iv. identify the major constraints to fish value chain actors in the study area.

## 120 **Methodology**

### 121 **The Study Area.**

122 The study was carried out in Ilaje Local Government Area of Ondo State, Nigeria. The state lies  
123 between latitudes  $5^{\circ} 4S$  and  $7^{\circ} 52N$  and longitude  $4^{\circ} 20^{\circ}N$  and  $6^{\circ} 05E$ . Its land area is about  
124 15,500 square kilometers. Ondo State is bounded in the East by Edo and Delta State in the south  
125 by Bight of Benin and Atlantic Ocean. Ilaje was purposively selected due to its predominant  
126 coastal wetland suitable for fish farming. It is situated within the mangrove rain forest and has an  
127 annual rainfall ranging between 2000-3000mm per annum.

### 128 **Data Collection and Sampling Technique**

129 Data were collected through primary source with the aid of well-structured questionnaire.

130 Purposive sampling techniques were used in the selection of four fishing communities namely;  
131 Awoye, Odofado, Zion Pepe and Araromi sea side. The selection was based on their fishing  
132 intensity. From the selected communities, 35 fishermen, 35 processors and 35 marketers were  
133 randomly selected at the central market arena to give a total of 105 respondents.

### 134 **Data Analysis and Analytical Procedure**

135 Data were analyzed using descriptive statistics and gross margin model

### 136 **Descriptive Statistical Tools**

137 Frequency tables, and percentage were used to describe the socio-economic characteristics of the  
138 respondents. The characteristics include the age, marital status, educational attainment, primary  
139 or major occupation, experience of the fishermen, marketers and the processors.

### 140 **Gross Margin Analysis**

141 The budgeting techniques was used to determine the gross margin and income at each stage of  
142 the chain.

**Comment [M2]:** Map is important in such study if available.

143 The model for the estimation of the gross margin is as;  $GMI = \sum TR - \sum TVC$

144 Where;  $TR = P_y \cdot Y_i$ ,  $TVC = P \cdot X$ ,  $TC = TVC + TFC$ ,  $NROL = NFI / TR$ ,  $NFI = GM - TFC$

145  $NPM = NFI / TC$ ,  $BCR = TR / TC$

146  $GM =$  Gross Margin (₦)

152  $Y =$  Price of Output (₦)

147  $TR =$  Total Revenue (₦)

153  $PX_i =$  Unit Price of Variable Input Used

148  $TVC =$  Total Variable Cost (₦)

154 (₦)

149  $TC =$  Total Cost (₦)

155  $X_i =$  Variable Input (₦)

150  $NROL =$  Net Return on Investment (₦)

156  $NFI =$  Net Farm Income (₦)

151  $P_y =$  Unit Price of Output (₦)

157  $NPM =$  Net Profit Margin (₦)

158  $BCR =$  Benefit Cost Ratio (%)

## 159 Depreciation

160 Depreciation on fixed assets used were calculated, using a straight line method (SLM) which  
161 assumed salvage value of zero naira. The formula is specified as;  $DS =$

162 Where:  $DS =$  Annual depreciation,  $AC =$  Asset Cost,  $SV =$  Salvage Value,  $L =$  Useful Life Year.

## 163 Results and Discussion

164 The actors in the artisanal fish value chain in the study were identified as; the fishermen, fish  
165 processors and fish marketers.

### 166 Socio-Economic Characteristics of the Fishermen in the Study Area

#### 167 Gender of the Respondents

168 The result as shown in table 1 indicated that all fishermen in the study area were male (100%).

169 This could be attributed to strenuous and tasking nature of their operations which the male

170 gender could possibly handle better than the weaker female counterpart. These findings is in line

171 with the finding of Onemolease and Oriakhi (2011). Olubanjo et al (2007), Olaoye and Odebiyi

172 (2011), Olawunmi et al (2010). Majority of the processors (91.2%) and marketers (97.10%) were

173 female, indicating the dominance of women in processing and marketing of fish in the study

174 area. This result is in line with the findings of Inioni and Olayide (2007), who opined that the  
175 role of women in fishing cannot be over emphasized.

#### 176 **Age of Respondents**

177 The ~~study revealed that majority of the actors in the value chain were~~study revealed that majority  
178 ~~of the actors in the value chain was~~ below 50 years of age. This implied that majority of people  
179 involved in fishing operations are in their active age. ~~This findings~~This finding agreed with  
180 Bello, (2000) and George et al (2010) that age had a positive correlation with agricultural  
181 productivity.

#### 182 **Household Size**

183 The relatively large and medium household sizes of majority of the actors in the study area may  
184 reduce expenses incurred on hired labour for the operations.

#### 185 **Educational status/ Membership of Association**

186 The study also revealed that majority of the actors (94.3% of fishermen, 54.3% of processors and  
187 51.4% of marketers) had one form of education or the other. Therefore the number of years spent  
188 in formal education enhances the knowledge ability to adopt modern technology in improving  
189 their fishing activities.

190 The study further indicated that all (100%) of the marketers were in one form of union/  
191 association or the other, while the fishermen and the processors were not into any form of  
192 association.

193 Table 1; **Socio-Economic Characteristics of the Respondents**

Variables	Fishermen		Processors		Marketers	
	Freq.	percent	Freq.	percent	Freq.	percent
<b>Gender</b>						
Male	35	100.0	2	8.8	1	2.90
Female	0	000	33	91.2	34	97.10

<b>Total</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>
<b>Age</b>						
Less than 30	5	14.3	5	14.3	4	11.4
31- 50	19	54.3	22	62.9	19	54.3
51- 60	7	20.0	3	8.5	12	34.3
61-65	4	11.4	5	14.3	0.00	0.00
<b>Total</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100</b>
<b>Marital status</b>						
Single	4	11.4	1	2.83	2	5.7
Married	21	60.0	28	80.0	27	77.1
Divorced	5	14.3	6	17.14	4	11.4
Widow/widower	5	14.3	0	0.00	2	5.7
<b>Total</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>
<b>Household size</b>						
1-3	13	37.1	16	45.7	14	40.0
4-7	17	48.6	19	54.3	18	51.4
Greater than 7	5	14.3	0	0.0	3	8.6
<b>Total</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>94.6</b>	<b>35</b>	<b>100.0</b>
<b>Educational status</b>						
No formal	2	5.7	8	22.9	12	34.3
Pry	10	28.6	15	42.8	9	25.7
Sec	7	20.0	5	14.3	9	25.7
Tertiary	16	45.7	7	20.0	5	14.3
<b>Total</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>
<b>Association</b>						
<b>Yes</b>	-	-	-	-	<b>35</b>	<b>100</b>



No	-	-	-	-
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194 **Source; field survey, 2019**

**Table 2: Descriptive Statistics on Cost and Returns of Marketers**

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
Price/ basket fish	35	3,000.00	15,000.00	216,781.75	6,193.7500	2,544.68928
Price after purchase	35	3,500	17,000	244,800	6,994.29	2,981.901
Price outside the environment	35	4,000	20,000	282,100	8,060.00	3,245.830

195 **Source; field survey, 2019**

196 From table 2 above, the average cost of purchase of a standardized basket of fresh fish from the  
 197 fishermen in the study area was ₦6, 193.75.00, immediately after purchase, and without any  
 198 value addition, the same quantity of fish were sold at an average of ₦6, 994, 29 and ₦8, 060.00  
 199 outside the environment. The implication of [this;this](#) is that non- member of fish marketers  
 200 association have no direct contact with the fishermen, hence must pass through them for the  
 201 purchase of fish, while a profit margin of about ₦801.29 is realized from immediate purchase  
 202 within the same environment and an average of ₦1866.25 from the sale of same basket outside  
 203 the environment.

204 **Profit Margin of Marketers**

205 Average purchasing price of fish from fishermen = ₦6193.75

206 Average selling price immediately in the same location = ₦6494, 29

207 Average selling price outside the location = ₦8060.00

208 **i. Profit margin of marketers on same location**

209 Average revenue from sales in same location = ₦6494, 29 - ₦6193.75 = ₦300.54

210 Net return on investment (benefit/ cost) = 6494, 29/ 6193.75 = 1.04

211 That is on every ₦1 invested in fish marketing in the same location and sell within the location  
212 4kobo is realized.

213 **ii. Profit margin of marketers outside the location**

214 Average revenue from sales outside the location = ₦8060.00 - ₦6193.75 = ₦1866.25

215 Net return on investment = benefit/ cost = 8060.00 / 6193.75 = 1.30

216 The implication of [this finding](#) is that on every ₦1 invested, 30kobo is realized

**Gross Margin Analysis For Fish Processor**

217 **Average variable cost**

218 Average cost of fish purchased = ₦260, 508. 10, Average Cost of firewood = ₦27,437.14

219 Average transportation cost = ₦1,018.57, other variable cost = ₦2,146.57

220 Average labour cost = ₦10,925.71, Average variable cost = ₦302,036.09

221 **Fixed cost**

222 Cost of drum = ₦14,271.42 Cost of basket = ₦25,485.71

223 Cost of wire = ₦9,868. 57 Average fixed cost = ₦49625.70

224 Average total cost (ATC) = AVC+ AFC = 303,036.09 + 49, 625.70 = ₦352,661.79 =

225 ₦352,661.79 Average revenue = Px\*QX, AR = ₦396, 533.33

226 Profit = AR - ATC = 396, 533. 33 – 352,661.7 = ₦43, 871, 54

227 Fish processing is a profitable venture worth investing because it has a positive margin of  
228 ₦43,871.54.

229 Net return on investment for fish processing =

230 = = 1.12

**Comment [M3]:** This is not clear, what do you mean by QX, explain. How do you arrive at the value of QX.

231 The return on investment is 1.12, meaning that on every ₦1 invested in fish processing, 12kobo  
232 is realized.

233

#### 234 **Depreciation on fixed equipment**

235  $OC = 41,903.78, \quad SV = 0$

236 It is assumed that equipment has a shelf life of 3years

237  $41,903.78 / 3 = 13,967 / \text{ annum}$

238 Monthly depreciation =  $13,967 / 12 = 1,163.99$

239 = ₦1,163.99 must be set aside as depreciation value.

240 The main actor in the value chain are the marketers because of the strong association that  
241 prevent others from buying directly from the fishermen, even the processors sometimes do not  
242 have direct access to the fishermen except through the marketers

#### 243 **Table 3: Gross Margin and Net Return of Actors.**

Variable	Gross Margin	Net Return
Sales/Marketing at immediate environment	300.54	1.04
Sales/Marketing outside the environment	1866.25	1.30
Processor	43871.54	1.12

244

245 The table 3, shows the categories of the gross margin of the actors in the value chain

246 All the actors have a positive gross margin therefore each of the enterprise is profitable. Also all  
247 the net return on investment are greater than one therefore the sales of fish immediately at the  
248 environment was 1.04 indicating at every ₦1 invested, 4 kobo is realized, marketers outside the  
249 environment has a net return of ₦1.30kobo. Meaning that at every ₦1 invested 30kobo is  
250 realized while for processing net return of ₦1.12kobo is achieved meaning at every ₦1 invested  
251 12kobo is gained. The implication is that the marketers particularly sales after the environment  
252 has higher gross margin of ₦1866.25 kobo and a net return of ₦1.30 kobo.

253

254

## 255 **Conclusion**

256 Artisanal fish farming is a profitable venture with all the actors in the value chain enjoying  
257 different degree of profit. The two categories of marketers made a profit of ₦300.54 and  
258 ₦1,866/basket and [a-net-returnsa net return](#) of 1.04 and 1.30 respectively. The processors equally  
259 had a positive gross margin of ₦43,871.54 and [a-net-returnsa net return](#) of 1.12.

260 However, among the three actors in artisanal fish value chain in the area, the marketers are the  
261 main and most influential group. This is due to the strong associations of the group which  
262 prevent others (even processors) from buying directly from the fishermen. The over bearing  
263 influence of this marketers group reduces the gross margin and net returns of other actors in the  
264 chain.

## 265 **Recommendation**

266 Based on the findings of this study, it is recommended that;

- 267 • Fishermen and processor in artisanal fish value chain should form a strong association in  
268 other to reduce the effect and influence of the marketers on their profit.
- 269 • Fishermen should join cooperative societies in other to get needed inputs rather than  
270 getting financial assistance from middlemen/marketers who always use that to determine  
271 their faith in the business.
- 272 • Government and other relevant organizations should be involved in training and  
273 retraining of the different categories of the artisanal fish value chain players.

274

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UNDER PEER REVIEW