

## **STRUCTURAL PERFORMANCE OF ARTISANAL FISH MARKETING IN ONDO STATE, NIGERIA.**

By

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### **Abstract**

Fish is an important source of protein which is highly needed for human beings to experience necessary growth and development. This is the reason for the phenomenal rise in the consumption of fish in order to meet up with the body nutritional requirements. Therefore, marketing of this source of protein is inevitable as its distribution depends largely on the structure of the marketing system. This study examined the structural performance of artisanal fish marketing in Ondo State, Nigeria. Data collected from 250 artisanal fish sellers selected using multistage sampling technique were analysed using descriptive statistics, marketing and gross margin, Gini coefficient and Lorenze curve analyses. The results showed that artisanal fish marketing was profitable with a mean net return of N137.10/kg (\$0.85/kg). The estimated value of the Gini coefficient determined was 0.64, indicating the presence of inequality in the share of the artisanal fish market in the study area. It was realized that all the respondents in the study area, mentioned poor transport network, high transport cost, inadequate fund and inadequate storage facilities as major problems confronting artisanal fish market in the study area. Therefore, programmes that will improve fish marketing should be organized for fish marketers by the relevant government parastatals, extension workers, Non Governmental Organizations and the artisanal fish marketers should be sensitized on the formation of better organized fish marketing cooperative societies where they can solve some of their problems themselves.

Key words: Market Structure, Artisanal Fish Marketing, Gini coefficient, Lorenz curve.

### **Introduction**

Fish is very important in the diet of many Nigerians, high in nutritional value with complete array of amino acids, vitamins and minerals [6]. In addition, fish products are relatively cheaper compare to beef, pork and other animal protein sources in the country [7]. It is a known fact that fish has become the important source of protein to people in order to substitute for other animal proteins. This is the reason for the importance of the marketing of fish as marketing aids its distribution to the entire populace. [21] stated that the small - scale artisanal fishery sub-sector remains the backbone of fish production in Nigeria, contributing at least 70% of the total fish production in the last decade.

Marketing, as defined by [2] is a management process responsible for anticipating, identifying and then satisfying consumer wants and needs with a view of making profit. It involved transportation to bring the product to the right place, storage to adjust supply to demand over time, sorting, cleaning and processing in various ways. Marketing functions play vital roles in marketing of artisanal fish and marketing functions, according to [4], are the activities performed by a marketing system in relation to the characteristics of agriculture which include seasonality,

bulkiness, perishability, small quantities of production on small farms, non-consumable nature of some agricultural products in the raw form. These functions include that of assembling the products from various production centres, processing the commodities in the form that will be suitable for consumption, and then making every arrangement to get them distributed to consumers.

[4] further stated that some services are essential and must be carried out efficiently for marketing functions to be accomplished. These services are called marketing services and they include transportation, storage, grading and standardization, packaging, bringing sellers and buyers together, financing and risk bearing. According to [5] defined marketing channel as path between production and consumption. The author also classified it as either centralized or decentralized. A centralized marketing channel is one in which commodities are assembled in large central terminal market where they are purchased by wholesalers or processed or from farmer agent, while decentralized channel doesn't have such large assembly-marketing facilities and traders buy directly from farmer.

A list of suitable criteria for defining an adequate market situation, optimizing social welfare and maximizing the efficiency of agricultural marketing systems includes the market structure, its conduct and performance [4]. Structure is defined as the significant economic variables that characterize the organization [20]. It refers to certain characteristics of the market, which are believed to influence its nature of completion and the process of price formation. [4] defined market conduct as certain behaviours of firms in the market. They also added that market conduct is more or less influenced by market structure. [11] stated that performance is the outcome of the behavior of interaction of structure and conduct. It is the assessment of how well the process of marketing is carried out and how successfully its aims are accomplished. The elements traditionally classified under performance are profits, operational efficiency, pricing efficiency and stability and progressiveness, price stabilization of information, cost of sales promotion.

Artisanal fishermen operate in the nation's Rivers, Lagoon, Lakes, brackish waters and in the coastal waters not beyond 3 nautical miles of the territorial waters. According to [18], 'traditional', 'small-scale' or 'artisanal' fishery is used to characterize those fisheries that are mainly non-mechanized with low level of production.

In Nigeria, the coastal artisanal fishers use the traditional dug-out canoes or pirogue ranging from 3–18 metres in length while the gears used include cast nets, handlines, basket traps, longlines, set gillnets and beach and purse seines. The operating range of small-scale fisheries is around the 20 metres depth contour, with operations extending occasionally to a maximum depth of 40 metres [16].

Fish production in Nigeria is practiced in two environments namely fresh and salt waters. The fresh water fish production is classified into three major subsectors; artisanal captured fishery, industrial captured and Aquaculture. The artisanal captured fishery, production is achieved by individual or by small groups by the use of labour intensive gears. This is the most important subsector as it represents between 85-90% of domestic production and providing means of economic support and livelihood for millions of rural dwellers, particularly in Niger Delta, Northeast and Middle belt regions of the country [15].

[17] explained that Nigeria, like many other countries in sub-Saharan Africa, is endowed with substantial marine and inland fisheries resources, upon which the fisheries sector is based. However, since the 1980's, production trend in the sector has been very unstable particularly, in the coastal/brackish water artisanal sector which provides the bulk of the domestic production. [10] explained that it is estimated that about 10 million people particularly youths, are engaged in artisanal fishing in Nigeria.

[14] reported that artisanal fisheries in Nigeria provided more than 82% of the domestic fish supply, giving livelihoods to one. million fishermen and up to 5.8 million fisher folks in the secondary sector. However, Tietze *et al.* (2005) noted that the use of poor quality fishing materials can limit fish catch levels and that efforts should generally focus on the quest for improved fishing techniques and gears to replace the low yielding traditional fishing methods. With a huge potential area of between 12-14 million hectares, and a low production estimate put at about 700,000 million tons of fish annually, while current needs put at a minimum of 2 million metric tons of fish to feed the population of over 140 million [12]. The economic importance of these to the community include source of food, provision of employment, source of foreign exchange/income, tool to rural development and source of raw materials to manufacturers ([19]; [1]).

[13] then stated that the increasing production is not able to meet the increasing rate of consumption because of the wide gap between fish demand and supply, which is on the rise as a result of population explosion in the country in recent years. [17] stated that the capacity of artisanal fisheries to play its triple role of a food supplier, employment provider and income earner in the Nigerian economy depends on the adoption of appropriate management strategies that will ensure their sustainability in the face of intense fishing pressure. This study examined the structural performance of artisanal fish marketing in Ondo State, Nigeria. It looks at the socio-economic characteristics of the artisanal fish marketers, structure and conduct of artisanal fish marketing system in the study area, profitability of artisanal fish marketing, and operational efficiencies of the artisanal fish marketers in the study area.

### **Methodology**

**Study Area:** The study was carried out in Ilaje and Ese-Odo Local Government Areas of Ondo State, Nigeria. These areas were selected for the study because of their suitability for fishing activities as they are close to rivers where fishes are always available for consumption.

**Data Sources and Collection:** Data collected for the purpose of this study were gotten from primary source through the use of well structured questionnaires. As a result of low literacy rate of farmers, trained enumerators, who understood the local dialects, were used to administer the questionnaire on the artisanal fish marketers. Multistage sampling technique was employed in the selection of the respondents in the study area. In the first stage, purposive sampling technique was used to select two Local Government Areas (Ilaje and Ese-Odo LGAs) based on the predominance of fishing activities in these areas. The second stage featured random sampling technique to select five (5) fishing communities from each of the selected Local Government areas. The fishing communities selected are Igbokoda, Ayetoro, Orioke-Iwamimo, Araromi-seaside and Mahintedo from Ilaje, while Igbekebo, Ipoke, Agadagba Oboh, Igbotu and Kiribo are the fishing communities selected from Ese-Odo. The third stage also involved the random sampling technique to select 25 artisanal fish sellers from each of the ten selected communities totaling 250 respondents.

**Analytical Techniques:** Descriptive statistics such as frequency and percentage were used to analyze the socio-economic characteristics of the artisanal fish marketers and problems facing them. Budgeting analysis such as gross margin, net return and marketing margin analysis were used to analyze the profitability of artisanal fish marketing in the study area. Concentration ratio, Gini-coefficient, Lorenz curve and Herfindahl index were used to measure the market structure. Operational efficiency was also used to analyze efficiency growth. The gross margin is mathematically presented as

$$\text{Gross Margin Analysis (GM)} = \text{TR} - \text{TVC} \quad (\text{Eq. 1})$$

where GM=Gross Margin,  
TR=Total Revenue,  
TVC=Total Variable Cost.

Net returns is also given as;

$$\text{Net Returns} = \text{TR} - \text{TC} \quad (\text{Eq. 2})$$

where TR=Total Revenue,  
TC=Total Cost.

The measures of market structure are presented as follows;

$$\text{Concentration ratio } CR_i = \frac{\sum_1^i (S_i)}{\sum_1^n (S_n)} \quad (\text{Eq. 3})$$

Where,  $CR_i$  = Concentration ratio for first i firms

$S_i$  = Share of the largest i firms in the industry

$S_n$  = Share of the n firms in the industry

$i = 1, 2, 3, \dots, n$

$n$  = number of respondents.

([8]; [9]; [3])

$$\text{Herfindahl index (HI)} = \sum_{i=1}^n (S_i)^2 \quad (\text{Eq. 4})$$

where  $i = 1, 2, 3, \dots, n$ ,

$n$ =number of respondents,

$S$ = share of firm in the industry.

$$\text{Gini-coefficient } G = \frac{A}{(A + B)} \quad (\text{Eq. 5})$$

$A$  = Area that lies between the line of equality and the Lorenz curve

$A+B$  = Total area under the line of equality

**Lorenz curve:** The curve measures the degree of inequality that exists in the share of the industry's market size by its firms. It relates the total volume of product handled in a market to the percentage of firms in the market cumulated from the smallest to the largest. The curve bows outwards towards the southeast when there is inequality in the market share of the firms

## Results And Discussion

### Socio-Economic Characteristics:

#### Age of the Respondents

Table I shows the age distribution of the respondents in the study area. The results revealed that the respondents with age range of 31-40 years had the highest frequency with 37.6%. This is followed by the respondents with age range of 21-30 years old with 27.2%. The respondents with 51 years old and above constituted 10% of the total fish marketers sampled for the study. This implies that majority of the respondents between the ages of 21 and 40 years old, who are young and agile, involved in artisanal fish marketing in the study area.

**Table I: Age Distribution**

Age (Years)	Frequency	Percentage
≤ 20	12	4.8
21-30	68	27.2
31-40	94	37.6
41-50	51	20.4
> 50	25	10
Total	250	100

From Oparinde and Ojo (2011).

#### Marital Status of the Respondents

The marital distribution of the respondents as shown in Figure 1 indicates that 78% of the respondents were female, while the remaining 22% were male. This indicates that majority of the artisanal fish marketers were females which is in accordance with the *a priori* theory that marketing is the business of females in the study area.

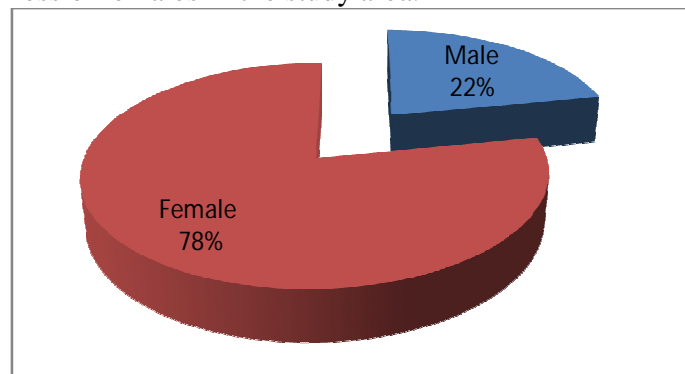


Figure1: Sex Distribution of the respondents.

### Sex of the Respondents

The results as shown in Figure 2 indicate that about 79.2% of the respondents were married, while just 10.4% were single. Also, the results revealed that 3.6% and 6.8% of the respondents were divorced and widowed respectively. This means that majority of the artisanal fish marketers in the study area were married. This will afford them the opportunity of getting family labour to be used for fish marketing. The low percentage of the divorced could be attributed to the value attributed to the marriage institution in the study area.

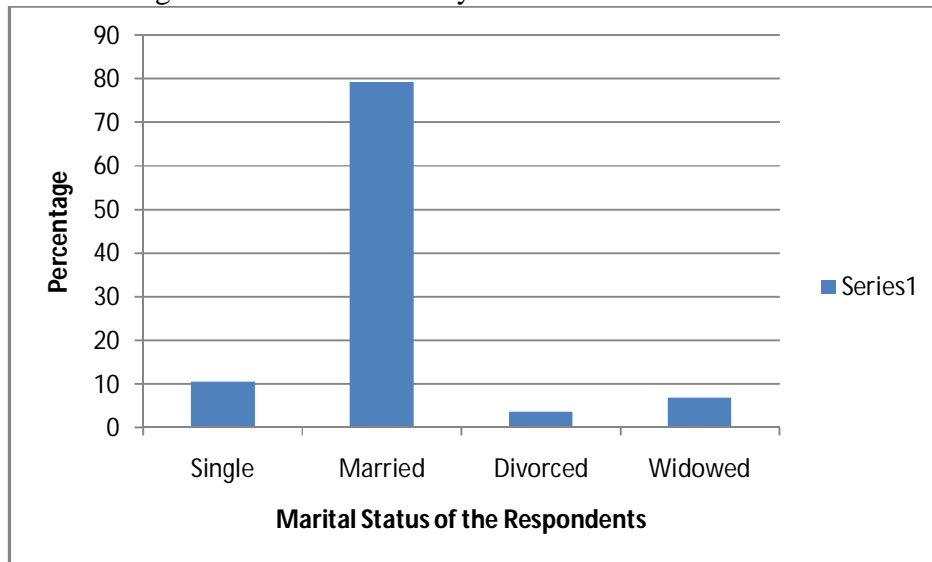


Figure 2: Marital distribution

### Level of Education of the Respondents

The distribution of level of education as shown in Table II shows that about 41.6% of the respondents, who were involved in artisanal fish marketing, had primary education, while 24% had secondary education. It equally revealed that 19.2% of the respondents had no formal education as just 15.2% had tertiary education. This implies that majority of the farmers in the study area had one form of education or the other which could assist them in the area of adoption of innovations brought to them by the extension agents and in making decisions that will enhance their marketing strategies.

Table II: Level of Education

Level of Education	Frequency	Percentage
No Formal	48	19.2
Primary	104	41.6
Secondary	60	24
Tertiary	38	15.2
<b>Total</b>	<b>250</b>	<b>100</b>

From Oparinde and Ojo (2011)

### Family Size of the Respondents

Table III shows that 44.8% of the respondents had between 4 and 6 household members, while 16.8% of the respondents had between 1 and 3 household members. Also, about 15.2% of the

respondents had between 7 and 9 household members, while 12% had between 10 and 12 household members. This implies that majority of the respondents would have access to people who can assist in carrying out their marketing activities, thereby increasing their opportunity of having improved revenue.

**Table III: Family Size**

Family size	Frequency	Percentage
1-3	42	16.8
4-6	112	44.8
7-9	38	15.2
10-12	30	12
>12	28	11.2
<b>Total</b>	<b>250</b>	<b>100</b>

From Oparinde and Ojo (2011)

### Major Occupation of the Respondents

Table IV shows that about 36% of the respondents had fish marketing only as their major occupation, while 32.8% of the respondents indicated fish processing and marketing as their major occupation. The results further showed that 18.4% of the respondents involved themselves in only fish processing, while the remaining 12.8% indicated civil service work as their major occupation. This implies that the respondents with highest frequency (36%) were fish marketers only. This may not be okay enough for them if there is a problem with fish marketing, since the respondents do not have diversification of means of livelihood.

**Table IV: Major Occupation**

Major Occupation	Frequency	Percentage
Fish marketing only	90	36
Fish processing only	46	18.4
Fish processing & Marketing	82	32.8
Civil servant	32	12.8
<b>Total</b>	<b>250</b>	<b>100</b>

From Oparinde and Ojo (2011)

### Experience of the Respondents

The distribution of fish marketing experience of the respondents as shown in Table V revealed that 28.4% of the respondents had less than 5 years of fish marketing experience followed by 22.8% of the respondents who had between 6 and 10 years fish marketing experience. The results also showed that about 17.6% of the respondents had between 16 and 20 years experience, while another 17.6% had above 20 years fish marketing experience. Therefore, this means that the respondents with highest frequency of 28.4% are relatively new in the business. This could be due to the fact that marketers have just entered the artisanal fish marketing because of some reasons which may include the profitability of the business.

**Table V: Experience**

<b>Experience</b>	<b>Frequency</b>	<b>Percentage</b>
≤5	71	28.4
6-10	57	22.8
11-15	34	13.6
16-20	44	17.6
>20	44	17.6
<b>Total</b>	<b>250</b>	<b>100</b>

From Oparinde and Ojo (2011)

### **Source of Finance**

Table VI shows the distribution of source of finance of the respondents in which about 34.4% of the respondents had their source of finance from personal savings, while 28.8% indicated cooperative and esusu as their source of finance. About 17.2% of the respondents also indicated that their source of finance came from friends and relations, while just 14% showed banks as their source of finance. The low percentage of the respondents who indicated banks as their source of finance could be as a result of the inability of the marketers to meet up with the collateral security required by the financial institutions. Therefore, it can be concluded that artisanal fish marketers may not be able to expand their business since majority of them depend on personal savings and cooperative societies where small amount of money could be gathered.

**Table VI: Source of Finance**

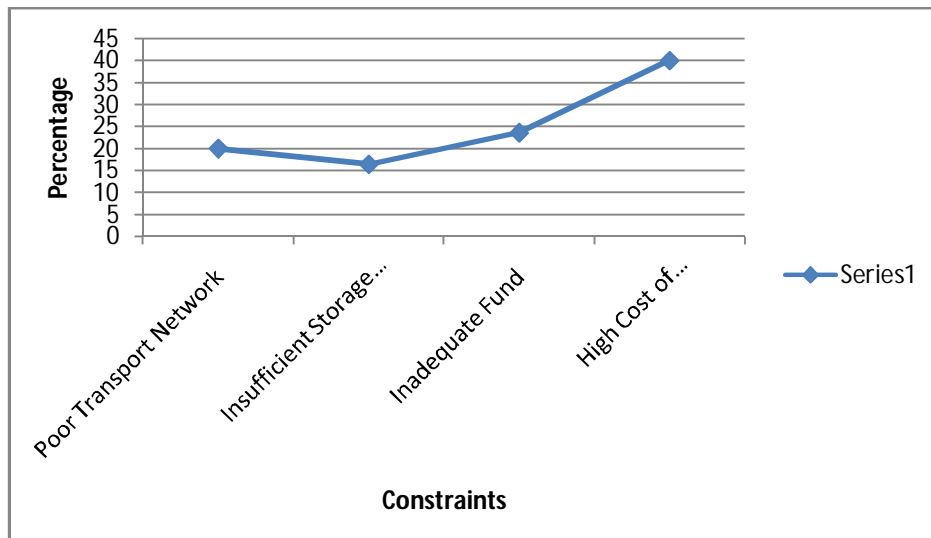
<b>Source of Finance</b>	<b>Frequency</b>	<b>Percentage</b>
Personal savings	86	34.4
Friends and relations	43	17.2
Cooperative and Esusu	72	28.8
Trade Association	14	5.6
Banks	35	14
<b>Total</b>	<b>250</b>	<b>100</b>

From Oparinde and Ojo (2011)

### **Constraints Facing Artisanal Fish Marketers**

The distribution of constraints facing artisanal fish marketers in the study area as shown in Figure 3 indicates that about 40% of the respondents identified high cost of transportation as the constraint facing them in the marketing of fish. Also, about 23.6% of the respondents indicated inadequate fund as the constraint facing their fish marketing activities, while 20% of them identified poor transport network as the problem facing them. This could be the reason for the inability of the artisanal fish marketers to attain better profit margin compared to what they were having.





**Figure 3: Constraints facing artisanal fish marketers**

### Profitability Analysis

Table VII presents profitability analysis with respect to Gross Margin and Net Returns of the respondents. The variable costs include cost of purchase, cost of transportation, labour cost and other operating expenses, while fixed costs covered cost of implements and interest on loan. The results showed that the mean revenue of the fish sellers was ₦175296274.4, while the mean total variable cost was ₦ 98424781. Also, the average fixed cost and average total cost were ₦3468564.70 and ₦101893345.7 respectively. The gross margin per kg realized by the artisanal fish marketers was ₦143.58, while average net-return of the fish marketers in the study area per kg was ₦137.10. This implies that artisanal fish marketing in the study area is profitable. Therefore, people are advised to go into this business so as to make a living.

**Table VII: Profitability Analysis of the Respondents**

<b>Variables</b>	<b>Value</b>
Quantity of fish sold (kg)	535397
Cost of Purchase (₦)	88418161
Cost of transportation (₦)	4780430
Wages (₦)	3829625
Other operating expenses(₦)	1396565
Total variable costs(₦)	98424781
Fixed costs (₦)	3468564.70
Total costs (₦)	101893345.7
Total revenue (₦)	175296274.4
Gross margin(₦)	76871493.4
Net profit (₦)	73402928.7
Marketing margin(₦)	86878113.4
Gross margin/kg	143.58
Net profit/kg	137.10
Marketing margin/kg	162.27

From Oparinde and Ojo (2011)

### Analysis of Measure of Market Structure

Artisanal fish marketers have some basic functions which include buying, selling, financing, risk bearing and merchandising. The results showed that there were no product differentiation. Also, the prices of fish were determined through bargaining powers of the parties involved (buyers and sellers) since there is non-uniformity of the prices of fish in the study area. As shown in Table VIII, the two largest marketers in the artisanal fish marketing business accounted for 25% of the volume of fish sold in the study area. The largest four marketers for 39% of the volume of marketed fish, while the largest eight marketers accounted for 49%. This indicates that the concentration in the industry can be said to be too low. The value of the Herfindahl index estimated was 0.05 which implies some degree of concentration in the industry. The estimated value of the Gini-coefficient determined was 0.64 which means that there was inequality in the share of the market. The value of the Gini-coefficient would have been zero if there was equality in the share of the market.

**Table VIII: Summary of Concentration Indexes**

Index	Symbol	Formula Used	Value obtained
Concentration Ratio	CR	$\frac{\sum_1^i (S_i)}{\sum_1^n (S_n)}$	CR <sub>2</sub> = 25%
			CR <sub>4</sub> = 39%
			CR <sub>8</sub> = 49%
Herfindahl Index	H.I	$\sum_{i=1}^n (S_i)^2$	0.05
Gini Coefficient	G.C	$G = \frac{A}{(A+B)}$	0.64

### Operational Efficiency of Artisanal Fish Marketers in the Study Area.

The mean operational efficiency of the Artisanal Fish Marketers was 15.5% which implies that there was no significant difference in operational efficiency of the respondents.

**Table IX: Computation of Gini Coefficient for Artisanal Fish Marketing in the Study Area**

Quintile	Income	Proportion of Income	Cumulative of Income	Proportion of Quintile
0	0	0	0	0
20	1752962.744	0.01	0.01	0.2
40	5258888.234	0.03	0.04	0.4
60	12270739.21	0.07	0.11	0.6
80	24541478.42	0.14	0.25	0.8
100	131472205.4	0.75	1.00	1.0

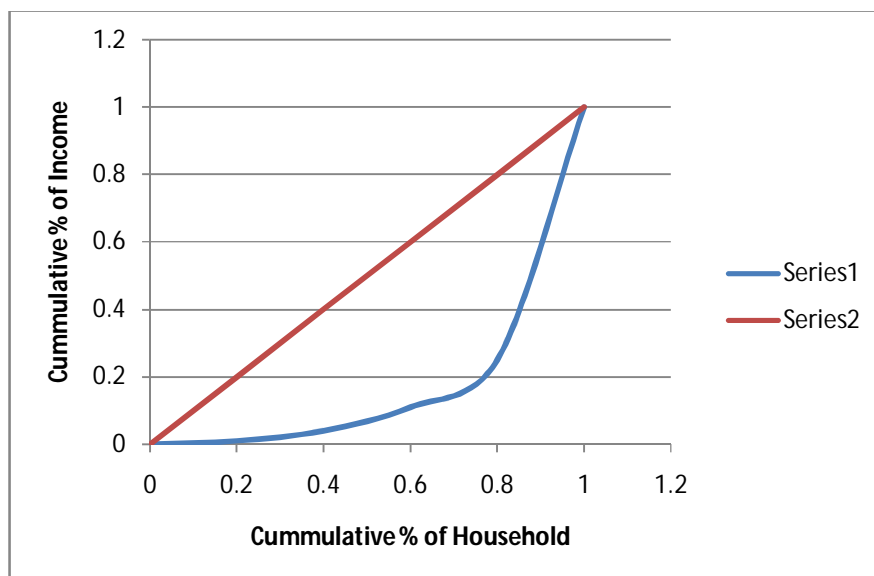
Total 175296274.4

From Oparinde and Ojo (2011)

Area between the line of perfect equality and the Lorenz Curve (A) = 0.5-0.182 = 0.318  
 Total area under the line of equality (A+B) = 0.5

$$\text{Gini-coefficient } G = \frac{A}{(A+B)}$$

$$\text{Gini coefficient} = \frac{0.318}{0.50} = 0.636 = 0.64$$



**Fig 4: Lorenz curve for the artisanal fish marketers**

## Summary, Conclusion and Recommendations

The empirical study examines the structural performance of artisanal fish marketing in Ondo state, Nigeria. Majority of the sampled artisanal fish marketers in the study area were young and agile. Female respondents dominated the study area and this is in line with the assertion that marketing is the business of females. Also, the results gotten from the study revealed that majority of the respondents had just primary education which could adversely affect their marketing strategy. The study showed that a large percentage of the respondents would have access to people who can assist in carrying out their marketing activities, while the experience of the sampled artisanal fish marketers revealed that they have just entered the artisanal fish marketing probably because of the profitability of the business. Artisanal fish marketers may not be able to expand their business since majority of them depended on personal savings and cooperatives societies where small amount of capital could be raised. The respondents identified various problems facing them in artisanal fish marketing and they include poor transport network, insufficient storage facilities, inadequate fund and high cost of transportation. This could be the reason for the inability of the artisanal fish marketers to attain better profit margin compared to what they are having now.

The profitability analysis revealed that the average net- return of artisanal fish marketers in the study area per kg was ₦ 137.10. This implies that artisanal fish marketing in the study area is profitable. Therefore, people are advised to go into this business so as to make a living. The concentration ratio indicates that the concentration in the industry can said to be too low. Also, the estimated value of the Gini coefficient which was 0.64 implies that there was inequality in the share of the market. The operational efficiency of the artisanal fish marketers which was 15.5% indicates that there was no significant difference in operational efficiency of the respondents.

It can, therefore, be concluded that artisanal fish marketing is profitable and higher profit margin can be attained by the marketers if attentions are given to the problems identified by the respondents.

It is pertinent at this point in time to recommend that relevant government parastatals, extension workers and non governmental organizations should organize programmes that will improve artisanal fish marketing. Also, awareness should be created on the formation of better organized fish marketing cooperative societies through which some of their problems can be collectively solved and series of benefits can easily be accessed by the members. Credit facilities should be made available by credit institutions and agencies to improve fish marketing. Also, sophisticated storage facilities/cold rooms should be provided by the government as well as cooperative societies in order to have easy storage of unsold fish till the following day.

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