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Value-Chain Analysis for Coastal Fisheries Development in Nigeria

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Abstract - This study evaluated the coastal fisheries value chain (CFVC) of Ogun Waterside Local Government Area (LGA), Nigeria. 176 fisherfolks were selected using purposive and simple random sampling techniques for interview schedule administration. Data collected were analyzed using descriptive and inferential statistical tools. Fishermen, fish processors and fish-marketers were the major actors of the CFVC and their average ages were $34.79+0.57$, $39.05+0.58$ and $36.73+0.65$ years; 91.7%, 57.8% and 70.4% of them were married, having an average household size of 9, 10 and 6 persons respectively. Actors in the CFVC were mainly uneducated (43.1%, 31.2% and 66.0% respectively). Chi-Square analysis revealed a significant association ($P < 0.05$) between the socio-economic characteristics and total revenue of the respondents. There was no significant association between the constraints faced by the fishermen ($\chi^2=0.253$, $P > 0.05$) and total revenue; although it was significant for the fish processors ($\chi^2=0.000$, $P < 0.05$) and fish-marketers ($\chi^2=0.000$, $P < 0.05$) at 95% fractile level. The study concluded that poor transportation network, high cost of fishing inputs, inadequate funding and poor storage facilities were major constraints to CFVC development and that the fish-marketers stage was the most profitable compared to the other stages in the CFVC.

Keywords : value, coastal, artisanal, chain, development.

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VALUE-CHAIN ANALYSIS FOR COASTAL FISHERIES DEVELOPMENT IN NIGERIA

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Value-Chain Analysis for Coastal Fisheries Development in Nigeria

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I. INTRODUCTION

Nigeria has become a major destination for imported seafood ever since the Government made a tariff reduction on all fishery products in 2001 from 25% to 5% (NBS, 2006). The European Union accounts for more than 70% of the Nigerian sea food supply while the US provides about 1% (Nzeka, 2003). The massive potentials of a coastline of 853km, a 200 nautical miles Exclusive Economic Zone (EEZ), over 2,658 fish farms as well as 937 Dams and Reservoirs, 365 lakes and reservoirs and 687 ponds and floodplains totaling over 13 million hectares of water bodies (Earth Trends, 2003) remain largely untapped. Despite the abundant fisheries resources and the relatively high consumption of fish in Nigeria (FDF, 2008), its domestic output of 0.85 million metric tonnes in 2010 still falls short of demand of 3.02 million metric tonnes (CBN, 2007; FDF, 2008; FDF, 2010). The fisheries sector

represent a major food source, which is invaluable for the protein they provide and the industrial products they produce. Fish is economically, socially and culturally important as a global dietary aspect of sustainable food security. Economically fish provides an important source of food and income for both men and women and fishing has an important social and cultural position in riverine communities. However A deficit of 2.17 million metric tonnes is required to meet the ever increasing demand for fish in Nigeria. This large deficit between the demand and supply of fish is augmented by massive importation of frozen fish which is a rigorous drain on the exchange earnings of the nation (FDF, 2008).

Availability of fish to the consumers at the right time, right form, right place and at the lowest possible cost requires an effective marketing system (Shamsuddoha, 2007). Marketing of fish passes through various market participants and exchange points before they reach the final consumers (Ali *et al.*, 2008). Nigeria has a great potential of fish resources whose distribution and value chain needs to be strengthened and developed to bridge the gap between demand and supply of fish in Nigeria (Amao *et al.*, 2006).

Fish is highly susceptible to deterioration without any preservation or processing measures (Okonta and Ekelemu 2005). Immediately fish dies a number of physiological and microbial deterioration sets in which invariably degrades the quality of fish (Eyo, 2001). It will become unfit for human consumption within about one day of capture, unless it is subjected to some form of processing or preservation. Even after the fish has been processed, particularly if traditional methods have been used, the fish is still subject to many forms of loss and spoilage. Hence, fish being a highly perishable substance needs to be transported to the consumer or final user in time (Ali *et al.*, 2008) to avoid post harvest spoilage through a coordinated marketing channel (fish value chain).

Based on the aforementioned, the following research questions become pertinent:

1. Who are the actors or institution that makes up the coastal fish value chain?
2. What are the socio-economic characteristics of the major actors that make up the coastal fish value chain?
3. What is the structure of the fresh and processed fish value chain?
4. What are the constraints to the identified fish value chain?

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a) Objectives of the Study

i. Main Objective

To analyse and develop the fish value chain in the coastal community of Ogun Waterside, Ogun State, Nigeria

ii. Specific Objectives are to

The following specific objectives were addressed in order to achieve the broad objective:

1. Identify and describe the socio-economic characteristics of all the institutions that make up fish value chain in the study area.
2. Identify and analyze the structure of the fresh and processed fish value chains
3. Determine the constraints hindering the development of the identified coastal fish value chain.

b) Justification of the Study

Hunger, malnutrition, and poor health are widespread and serious development challenges hindering economic development in Nigeria. These can only be overcome by providing the ever rising human population with better employment opportunities to improve their livelihoods (Akinrotimi *et al.*, 2007) and also adequate nutrition to reduce the nutritional deficiencies prevalent in Nigeria. The Nigerian fishery industry plays a significant role in the development of this country by providing livelihood for more than 50 million people in terms of employment, income generation and provision of principal protein to the diet (Akpaniteaku *et al.*, 2005). Each year, there are an additional 80-90million people to feed, most of them in developing countries, the most reliable source of protein for many of them is fish (Nzeka, 2003). However, irrespective of the great opportunities embedded in capture fisheries in Nigeria, a lot of the fish resources are being discarded on a daily basis due to an unorganized or uncoordinated distribution channel (Aihonsu and Shittu, 2008). Analyzing fisheries value chain provides an insight into various employment opportunities that remain untapped in the fisheries sector (Kaplinsky and Morris, 2000). Fish value chains in Nigeria are not yet developed to meet international market requirements as limited value addition is done in the industry, with the result that market for fish and fish products are limited to domestic markets (Investopedia, 2011). Over the past decade, development practitioners have increasingly shifted their attention from farming systems to targeting agricultural value chains and fisheries by extension, to improve smallholder production and participation in markets (Rota and Sperandini, 2010). This is because small-scale producers are often unable to increase production by adopting productivity-enhancing technologies unless the value chains for their products are sufficiently developed and dynamic (Kaplinsky and Morris, 2000).

c) Hypotheses

The hypotheses of the study tested in the null forms are:

- H₀1: There is no significant relationship between the socio-economic characteristics of the chain actors and their total revenue.
- H₀2: There is no significant relationship between the total revenue of the chain actors and the constraints faced.

II. MATERIALS AND METHODS

a) The Description of the Study Area

The geographical location chosen for this study is the Ogun waterside area of Ogun State, Nigeria. The proximity of the area to the Atlantic Ocean, Lagoon systems and in particular, to the good, albeit complex network of streams, rivers, and other water-bodies make the area an appropriate geographical location for this study. She is located in the eastern part of Ogun state sharing boundaries with Ondo state in the north, Lagos state in the south and Ijebu east local government in the west. About half to three quarter of the length of the local government is surrounded by water extending from Lagos state to Ondo state, this peculiar feature gave birth to the name waterside. The study area is closely associated with other maritime states of South-western Nigeria. The area comprises over 50 towns and villages with Headquarter at Abigi at 6°29'N 4°24'E / 6.483°N 4.4°E (www.wikipedia.com), while the main town in this area are Iwopin, Oni, Ibiade, Abigi, Efire, Ilushin, Makun-Omi, Ode-Omi and Lomiro, the area consists largely of Yoruba speaking people of which, the Ijebus comprise about 70 percent, with the Ikales, Ilajes, Itsekiris and Urhobos making up the remaining 30 percent. It has an area of 1,000 km² and a population of 72,935 at the 2006 census. This area is also blessed with a large expanse of fertile land (soil) rich in organic matter, well drained and deep which makes it support various crop cultivation especially plantation crops such as oil palm . The choice of the local government is by its close proximity to the Atlantic Ocean and its relative endowment with a complex network of streams, rivers, brackish water and in particular the extension of the Lagos (Lekki) Lagoon to the area. It is the only area of the state with a coastline on the Bight of Benin and also borders Lagos lagoon (Fig 1).

b) Sample Size and Sampling Techniques

A purposive sampling technique was used in the selection of four (Igbosere, JK Camp, Olosumeta and Elefon) coastal fishing communities from the 23 fishing villages of Ogun state coastal area based on their intensity of fishing activities. The second stage involves the use of simple random sampling in the selection of 30% of the fishermen and fish processors in the four selected communities who were interviewed to

give a total of 72 and 64 respondents respectively. Lastly a purposive sampling method was used in selecting 40 fish marketers at their central market arena to give a total of 176 respondents as indicated in the table 1.

i. *Analytical Procedures*

Combinations of statistical, budgetary and parametric analysis were used to analyze the obtained data. These include descriptive analysis, inferential statistics and profitability indicators.

ii. *Descriptive Statistical Tools*

Frequencies, tables, pie-charts, bar charts and percentages were used to describe the socio-economic characteristics of the respondents. The characteristics included the ages of the farmers, marital status, educational attainment, major occupation, farming experience, sex among others.

III. RESULTS

a) *The socio-economic characteristics of the fish value chain actors at the coastal area of Ogun state, Nigeria*

The socio-economic characteristics of all institutions and actors that make up the fish value chain in the study area are presented in Table 2. One hundred percent of the fishermen and fish processors were male and female respectively; while 14.2% and 85.8% of the fish-marketers were male and female respectively. Most (43.1%) of the fishermen fell within the age bracket of 41-50 years with a mean age of 43.79 ± 0.57 , 39.05 ± 0.58 and 36.73 ± 0.65 ; while 46.8% and 50.6% of the fish processors and fish-marketers were within the age range of 31-40 years respectively. However, the ages of 11.2%, 0.0% and 8.8% of the fishermen, fish processors and fish-marketers were higher than 50 years respectively.

Majority (91.7%, 57.79% and 70.4% respectively) of the fishermen, fish processors and fish-marketers were married with household sizes of 6-10 persons and a mean household size of 9, 10 and 6 persons. Most (54.2% and 52.8%) of the fishermen and fish-marketers practiced Islam, while 56.2% of the fish processors were Christians. Respondents with primary school leaving certificate were 36.1% (fishermen), 49.9% (fish processors) and 13.2% (fish-marketers) as against 31.2% of fish processors with no formal education; hence the high level of illiteracy among value chain actors in Ogun Waterside LGA.

The survey further revealed that out of the 100% fishermen, fish processors and middle men who practiced their occupation on a full time basis, 65.5% (fishermen), 40.6 (fish processors) and 0.0% (middle men) practiced farming as their minor occupation. Based on the years of experience in fish-related business, 26.41%, 74.9% and 37.4% of fishermen, fish

processors and fish-marketers respectively had between 11 and 20 years of experience. Out of the 72, 64 and 45 fishermen, fish processors and fish-marketers interviewed respectively, 72 (100.0%), 44 (68.6%) and 17 (38.4%) were not members of any cooperative societies. The structure of the identified coastal fish value chain as mapped out during the survey is presented in Fig 2.

b) *Constraints to fish value chain development*

79.2% and 62.4% of the fisherman and fish processors reported poor transportation network to their coastal communities as a very severe constraint to the fish value chain development in the coastal area of Ogun State, Nigeria while 82.2% of the fish-marketers regarded poor storage facilities as a major and very severe constraints to the fish value chain development as indicated in Table 5.

IV. DISCUSSION

This research project evaluated the fish value chain in the coastal area of Ogun State, Nigeria. The study identified 3 major marketing nodes along the coastal area, including: fishermen, fish processors and the fish-marketers. All fishermen (100%) and all fish processors (100%) in the Ogun Waterside coastal fish value were male and female respectively. This could be attributed to strenuous and tasking nature of the typical fisherman's work which the male gender could possibly handle better than the weaker female gender; but is opposed to the practice in Idaleketa, another coastal community in Ogun Waterside where only the female gender could fish. These findings were in line with the findings of Olubanjo *et al* (2007), Olawumi *et al* (2010) and Olaoye and Odebiyi (2011) where the business was gender biased. Many (43.1%, 46.8% and 50.6%) of the fisherman, fish processors and fish-marketers interviewed were between 31 and 40 years of age, a highly productive and active age when actors could undertake strenuous task. This is in line with the findings of Bello, (2000) and George *et al* (2010) that age had a positive correlation with agricultural productivity.

In rural communities, marriage is a respected and prestigious institution that bestows social status and recognition on people. The marital status of respondents as presented in Table 4 indicated that 91.7%, 57.7% and 70.4% of the respondents respectively were married, implying that most of the women involved in the fish value chain in the study area were married, suggesting that marriage is a cherished value in the study area, with a resultant increase in their household size. This corroborates with the findings of Alfred and Fagbenro, (2006) and Odulate *et al* (2011) who reported higher percentage of married women in the coastal communities of Ondo and Ogun states, Nigeria respectively. From these results, it could be inferred that Islam was mostly practiced by the

fishermen (54.2%) and fish-marketers (52.8%) than other religions; while the majority (56.2%) of fish processors were Christians. This could be attributed to the fact that fish cuts across all the religion unlike other animals like pig.

Majority (58.4% of fishermen, 80.0% of processors and 33.0% of fish-marketers) of the Actors in the Ogun Waterside coastal fish value chain had household sizes ranging between 6 and 10 persons. This relatively large household size may decrease the number of labour needed at different nodes along the coastal fish value chain. These results were similar to the findings of Fabusoro *et al.*, (2007) that average household size in Africa was about 9 persons.

Education is an important factor which can influence fish production and determine level of awareness on the rate of return on value addition in fish. Results from this study showed that 43.1%, 31.2% and 66.0% of fishermen, fish processors and fish-marketers respectively had no form of education at all; while 36.14% (Fishermen), 49.9% (Processors) and 13.2% (Fish-marketers) respectively had a maximum of primary school education. This confirmed the general opinion that most fisherfolks were illiterate or semi-illiterates; most of whom have dropped out of the formal school system (Olubanjo *et al.*, 2007; and Alfred *et al.*, 2008). The low level of education in the Ogun waterside coastal fish value chain could be explained by two reasons: firstly, fishing communities are generally isolated and marginalized, with limited or no access to education services. Available government schools are very far, at distances of at least 30 to 40 kilometers from coastal communities. Additionally, regular flooding and threats from hostile crocodiles and hippopotamus are other reasons for parents not to send their children to school. Another important factor, given that fishing is the main economic activity, is that children are often assimilated into the fishing industry at an early age by having to help their parents or guardians in fishing and fish processing. These children are born and brought up in remote fishing communities with limited or no access to education. Due to the above mentioned threats, children often abandon school if they had a chance to even attend one.

Experiences in fishing were determined by the number of years the fisherfolks had been in the business. The respondents' mean years of experience was found to be 23years, 21years and 15years for fishermen, processors and fish-marketers respectively. It is believed that this would enhance their efficiency. This finding is in line with Schumpeterian theory of economic development, which suggests that technical efficiency is influenced by technical knowledge and understanding in addition to other socio – economic environment in which the fisher folks must take decision (Kalirajan, 1990) as cited by Olaoye *et al.*, (2012)

Fish and fish related business as the major occupation in the study area is a function of the importance attached to it as a source of livelihood. All the respondents had fishing, fish processing and fish marketing respectively as their major occupation; thus are likely to commit more number of hours and efforts towards the success of these enterprises. Cooperative Society involves social participation that helps farmers to pool their resources together, have access to fisheries inputs and insights in emerging issues in the business. Membership of cooperatives therefore influences the adoption of improved fisheries technologies resulting in higher productivity and poverty alleviation. Majority of the actors (100%, 68.6% and 38.4% of the fisherman, fish processors and fish-marketers respectively) were not in any cooperative society; which may be the reason for not benefiting from any source of loan. This was a throwback to the position of Akinbile (1998) as cited by Odebiyi (2010) that cooperative groups ensure that their members derive benefits from the groups such as they could not derive individually. One of the biggest challenges faced by the seafood sector in the coastal fishing community is value addition. A deprivation of value addition facilities in the study area is a major setback to the fish value chain industry, most of the respondents regarded poor transportation network and lack of storage facilities as major constraints to the value chain development.

V. CONCLUSION

The value-chain for the fresh and processed fish in the study area is comprised of three main stakeholder groups before fish reaches the consumer. There are virtually no exports of artisanal captured fish, and so the value-chain is short and simple compared to some value chains in other countries. One of the biggest challenges faced by the seafood sector in the coastal fishing community is value addition. Lack of value addition facilities in the study area hindered the development of the fish value chain industry. Smoking was the only form of value addition at the coastal area of Ogun State, Nigeria. Lack of adequate road network hindered other means of value addition to the fish industry which could have created additional employment opportunities along the coastal zone of Ogun Waterside LGA, Nigeria.

a) Recommendation

The study recommends that there is need to develop a comprehensive and effective road networking in the study area as water is the only means of transportation which is a major constraint to the development of the coastal fish value chain. It should be noted that the development of the coastal fish value chain of Ogun waterside LGA would encourage youth involvement and participation in the value chain.

It is important to create awareness on the need for the formation of fish cooperative societies through which some of the challenges in the value chain can be successfully tackled. Credit facilities should be made available by financial institutions and agencies to improve fish value addition; for the purchase or leasing of fishing inputs (Canoes, Outboard Engine etc). Also, sophisticated storage facilities/cold rooms should be provided by government as well as cooperative societies for the storage of unsold fish.

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Table 2 : Socio-economic characteristics of the coastal fisheries value chain

Variables	Value Chain Actors					
	Fishermen		Fish Processors		Fish-marketers	
	Freq	%	Freq	%	Freq	%
Gender						
Male	72	100.0	0	0.0	6	14.2
Female	0	0.0	64	100.0	39	85.8
Total	72	100.0	64	100.0	45	100.0
Age						
< 20	0	0.0	0	0.0	0	0.0
21-30	14	19.3	30	46.8	12	26.4
31-40	19	26.4	18	28.3	23	50.6
41-50	31	43.1	16	24.9	6	13.2
>50	8	11.2	0	0.0	4	8.8
Mean \pm S.E	43.79 \pm 0.57		39.05 \pm 0.58		36.73 \pm 0.65	
Total	72	100.0	64	100.0	45	100.0
Marital status						
Single	6	8.3	11	17.16	4	8.8
Married	66	91.7	37	57.79	32	70.4
Divorced	0	0.0	10	15.6	7	15.4
Widow	0	0.0	6	9.36	2	4.4
Total	72	100.0	64	100.0	45	100.0
Religion						
Christian	27	37.5	36	56.2	21	46.2
Islam	39	54.2	20	31.2	24	52.8
Traditional	6	8.34	8	12.6	0	0.0
Total	72	100.0	64	100.0	45	100.0
Household Size						
1-5	0	0.0	0	0.0	13	28.6
6-10	42	58.4	51	80.0	32	70.4
11-15	30	41.7	13	20.0	0	0.0
Mean \pm SD	9.04 \pm 0.12		10.02 \pm 0.05		6.08 \pm 0.12	
Total	72	100.0	64	100.0	45	100.0
Education Level						
No formal education	31	43.1	20	31.2	9	19.8
Primary Education	26	36.14	32	49.9	6	13.2
Secondary Education	15	20.85	12	18.72	30	66.0
Tertiary Education	0	0.0	0	0.0	0	0.0
Total	72	100.0	64	100.0	45	100.0
Major Occupation						
Fisherfolks	72	100.0	64	100.0	45	100.0
Total	72	100.0	64	100.0	45	100.0
Minor Occupation						
Trader	21	29.2	38	59.3	30	66.0
Farming	47	65.3	26	40.6	0	0.0
Driver	1	1.39	0	0.0	15	33.0
Herbalist	3	4.2	0	0.0	0	0.0
Total	72	100.0	64	100.0	45	100.0
Years of experience						
1-10	8	11.1	6	9.4	4	8.8
11-20	19	26.41	48	74.9	17	37.4
21-30	31	43.1	8	12.5	15	33.0
>30	14	19.5	2	3.1	9	19.8
Mean \pm SD	22.7 \pm 0.61		20.95 \pm 0.54		15.3 \pm 0.63	

Total	72	100.0	64	100.0	45	100.0
Cooperative Membership						
Yes	0	0.0	20	31.4	28	61.6
No	72	100.0	44	68.6	17	38.4
Total	72	100.0	64	100.0	45	100.0

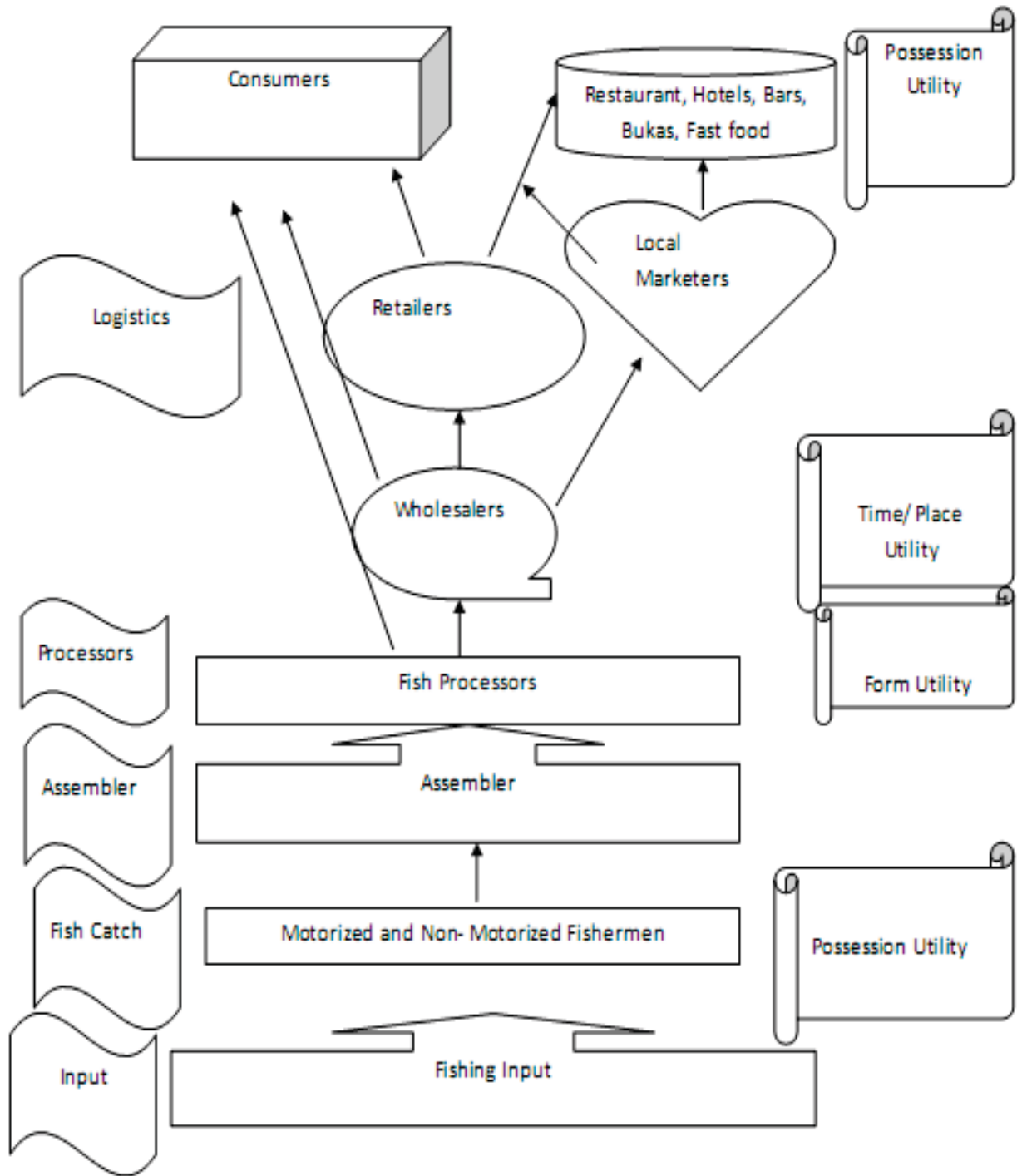


Figure 2 : Map of the coastal fish value chain in Ogun Waterside LGA, Nigeria
Source : Field Survey, 2013



Hypothesis Testing

Table 3 : H₀₁ There is no significant difference between the socio-economic characteristics of the chain actors and their total revenue

Variable	Fisherman			Fish Processors			Fish-marketers		
	Value	Df	Sig.	Value	Df	Sig.	Value	Df	Sig.
Age	34.2	9	0.000*	60.44	12	0.000*	135.000	12	0.000*
Marital Status	2.751	3	0.432	55.744	12	0.000*	66.937	8	0.000*
Religion	18.852	6	0.004**	41.007	8	0.000*	30.536	4	0.000*
HHZ	3.840	3	0.279	18.051	4	0.001**	90.000	8	0.000*
YOEX	10.212	9	0.334	78.222	12	0.000*	135.000	12	0.000*
Education	8.887	6	0.180	40.000	8	0.000*	57.600	8	0.000*

Source : Field Survey, 2012-2013; *=Significance at 0.001, **= Significance at 0.005

Key : HHZ = Household size, YOEX = Years of experience

Table 4 : H₀₂: There is no significant difference between the constraints faced by the chain actors and their total revenue

Variable	Fishermen			Fish Processors			Fish-marketers		
	Value	Df	Sig.	Value	Df	Sig.	Value	Df	Sig.
Constraints	21.54	18	0.253	84.44	8	0.000*	100.64	12	0.000*

Source : Field Survey, 2012-2013; *=Significance at 0.001

Table 5 : Constraints to the coastal area fish value chain development

Variables	Fisherman			Fish Processors			Fish-marketers		
	Very Severe	Severe	Not Severe	Very Severe	Severe	Not Severe	Very Severe	Severe	Not Severe
1. Inadequate fund	90.4	6.9	2.78	56.2	31.2	21.6	60.0	40.0	0.0
2. Poor storage facilities	0.0	0.0	0.0	0.0	22.0	78.0	82.2	17.8	0.0
3. Social amenities	98.6	1.4	0.0	74.9	25.1	0.0	8.9	20.0	71.1
4. High cost of fish input	11.1	88.9	0.0	12.5	37.4	50.0	71.1	20	8.9
5. Seasonality of fish	25.0	31.9	43.1	31.2	56.2	21.6	40.0	60.0	0.0
6. Poor transportation network	79.2	19.4	1.4	62.4	37.6	0.0	8.9	20.0	71.1
7. Breakage/spoilage of fish	2.8	69.4	27.8	18.7	65.5	15.6	0.0	100.0	0.0
8. Unpredictable weather	12.5	8.3	79.2	0.0	0.0	0.0	0.0	0.0	0.0
9. Trawlers' threat	62.5	30.6	6.9	0.0	0.0	0.0	0.0	0.0	0.0
10. Pollution effluents	66.7	26.4	6.9	0.0	0.0	0.0	0.0	0.0	0.0