



## **ECONOMIC ANALYSIS OF FISH VALUE CHAIN IN TARABA STATE, NIGERIA**

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### **ABSTRACT**

The study assessed the economic analysis of fish value chain in Taraba State, Nigeria. The broad objective of the study was to analyze the fish value chain in Taraba State. The specific objectives were to described the socio-economic characteristics of the actors in the value chain, to determine the cost and return of the various actors among the value chain and also to identify the problem encountered in fresh fish value chain. Descriptive statistics and gross margin analysis were used to analyzed the data obtained from the analysis it was found that females were found to dominate fresh fish marketing and processing nodes with about 68%, and 89%, respectively, while male (72%) dominate the production node and were also the majority (61%) of the consumers' household heads. Fish processors into dried/smoked in wet season made the highest margin of ₦3,302,000.00/kg, followed by fish processors into dried/smoked in dry season with ₦2,232,000.00/kg and roasted/fried fish marketers made the least gross margin of ₦416,202.17/kg Fish roasting (pepper-fish), frying, smoking and sun drying were the value addition carried out. Major constraints were inadequate capital, poor storage facilities, and high cost of transportation. It is recommended that cooperative society should be formed by the actors for the provision of storage facilities (cold room) in the market that will be conducive for storage of fish. Government should assist the fish marketers by reducing the tax imposed on them and providing them with loans and transportation facilities.

**Keywords:** Fish, Value chain, Producers, Processors, Marketers, HH index.

### **INTRODUCTION**

The term value-chain comprises of two key aspects the value ( satisfaction derived) and the chain (supply linkages and intermediaries). Value chain is the coordinated series of actors and actions required to produce, transform, and deliver products, ultimately delivering value to the end consumer. It describes the full range of activities which are required to bring a product from conception, through the different phases of production ( involving combination of physical transformation and the input of various producer services), delivery to final consumers, and the final disposal after use ( Kaplinsky and Morris, 2001). Value addition is any act that takes a (raw) product a step closer to the form in which it can conveniently meet the needs of the consumers.

Fish is one of the most important sources of animal protein in the tropics and it is widely accepted as a good source of protein and other vital nutrients for the maintenance of a healthy living ( Andrew, 2001). Fish is largely consumed in the country due to its rich nutritional and medicinal values. It constitutes 40% of protein intake in the country (FDF, 2000). Fish contains more nutrients and is relatively cheaper compared to beef, pork and other animal protein sources in the country (Amiengheme, 2005).

Nigeria has a great potential of fish resources whose distribution and value chain needs to be strengthen and developed to bridge the gap between demand and supply of fish in Nigeria (Amao *et al.*, 2006). Inspite of its abundance, Nigeria fish production volume and marketing



falls below expectation. This is due to the preponderance of fish demand over its supply. According to Tall (2004) there is low dissemination of appropriate fisheries related technologies in Nigeria, resulting in insufficient knowledge of fish handling, preservation, processing and distribution methods. The sustainable fisheries livelihood program attributed this trend to the limited contribution of fisheries research to fishery policy formulation in Nigeria (Sustainable Fisheries Livelihood Programme, Directorate for International Development, SFLP/DFI/FAO, 2002). This is because the main actors in the fishery policy development process are Government administrators rather than key fisheries research.

There are no existing documented facts concerning the fish value chain in Taraba state. A basic understanding of the value chain can enable policy makers in the state and Nigeria at large to formulate a sound policy and intervention program tailored to meet the needs of the sector. Therefore, this study hopes to fill the gap so as to improve the livelihood of the participants. Therefore, the broad objectives were economics of fish value chain. Specifically, the study described socio-economic characteristics of the actors in the study area, determined costs and returns and to ascertain the market structure in the study area and to described the constraints faced by the actors in the study area.

## **MATERIALS AND METHODS**

### **The Study Area**

The study will be conducted in Taraba State, Nigeria. Taraba state is located at the North Eastern part of Nigeria. It has 16 Local Government Areas and two Special Development Areas. It is divided into four Agricultural Development Programmes (ADPs) zones; A, B, C and D. It lies roughly between latitudes 6<sup>0</sup>20N and 9<sup>0</sup>40N of the Equator and between longitudes 9<sup>0</sup>00E and 12<sup>0</sup>00E of the Greenwich meridian (Oruonye and Bashir, 2011). The state covers a land area of about 54,473km<sup>2</sup> with a projected population of 2.9 million people by 2013 (NPC, 2007). Taraba State is located at the North Eastern part of Nigeria. It has 16 Local Government Areas and two Special Development Areas. It is divided into four Agricultural Development Programmes (ADPs) zones; A, B, C and D. It is bounded in the west by Nasarawa and Benue State, North-west by Plateau State, North by Bauchi and Gombe State, North-east by Adamawa State and South-east by Republic of Cameroon.

The State has a tropical climate marked by dry (November – March) and rainy (April – October) seasons. It has an average annual rainfall range between 800mm to 1950mm and the temperature ranges between 15<sup>0</sup>C to 38<sup>0</sup>C. The major occupation of the people of Taraba State is Agriculture. Cash crops being produced in the state include coffee, tea, groundnuts and cotton. Crops such as maize, rice, sorghum, millet, cassava and yam are also produced in commercial quantity. In addition, cattle, sheep and goats are reared in large numbers and people also under take other activities like poultry production and pig farming in fairly large scale. Communities living on the banks of River Benue, River Taraba, River Donga and Ibi engage in fishing all year round.

### **Sampling Procedure**

The population for the study were producers, processors and marketers of fish in Taraba State. Data was collected from primary sources, through the administration of well-structured questionnaire. A multi-stage sampling technique was employed in selecting respondents for the study. In the first stage, six Local Government Areas was purposively selected based on the preponderance of fishing activities.

In the second stage, two villages were purposively selected based on the intensity of fishing activities. In the last stage, simple random sampling was used to select the various actors, which are; the producers, processors and marketes of fish. Ten of each of the



participants were selected from each of the village selected. This will give a grand total of 360 respondents (Table 1).

**Table 1:** Sample Size Selection Plan

LGAs	Villages	Producers	Processors	Marketers
Ardo-kola	Mayo-ranewo	10	10	10
	Tau	10	10	10
Lau	Kunini	10	10	10
	Mayo-lope	10	10	10
Gassol	Tella	10	10	10
	Mutum biyu	10	10	10
Bali	Bali	10	10	10
	Suntai	10	10	10
Ibi	Dampar	10	10	10
	Ibi	10	10	10
Donga	Donga	10	10	10
	Mararaba	10	10	10
Donga				
Total		120	120	120

### Method of Data Analysis

Descriptive statistics such as: frequency tables, percentages and mean were used to address objective one and five.

The Herfindahl-Hirschman Index was used to analyze the structure of the Fish market along the value chain. The HHI is mathematically expressed as:

$$HHI = \sum_{i=1}^n S_i^2$$

where;

HHI = Herfindahl-Hirschman Index

$S_i$  = Market share of the  $i^{th}$  firm

$\sum$  = Summation sign

$n$  = number of marketers

Gross margin was used to determine the profitability of the fish market along the value chain. This is given by the formula:

$$GM = GI - TVC$$

$$TVC = TC - TFC$$

where;

GM = Gross Margin

GI = Gross Income ( ₦ )

TC = Total Cost ( ₦ )

TVC = Total variable costs ( ₦ )

TFC = Total fixed costs ( ₦ )

## RESULTS AND DISCUSSION

### Socio-economic Characteristics of the Value Chain Actors

The socio-economic characteristics of the respondents in Table 2 shows that (56%) of the fish producers, (55%) of the processors, (45%) of the marketers were within the active age bracket of 31 and 40 years. This is in agreement with the study of Agbebi and Fagbote (2012) who in their study revealed that majority (42%) of the fish marketers were within the active



age group of 31-40years, thus indicating that most of them were within the economically active population. (45%) of the fish consumers were within 41-50 years and have a mean of 40years along the value chains. Fish production is male dominated with (72%), while female dominate processing and marketing of fish with (68% and 89%) and (61%) male dominated the consumers. This finding is in consonance with that of Lawal and Idega (2004) who stated that the females' role was more in marketing of smoked fish than the males. Guste and Rosario-Malon (2004) stated that there was a gender division of labour in the fishery business. Women who are directly involved in fishing are more likely to be referred to as helpers or auxiliary fishers assisting their husband fishers in handling simple fishing equipment, gleaning and fish processing. Only few males are engaged in fish marketing. The fact that mean is dominant in the production of fish implies that male is always saddle with hard labour.

The results also shows that male is the majority in the consumption of fish. On educational level, it was revealed that (45%) of the respondent had higher education for producers, 48% primary education for processors, (48%) secondary education for marketers and (50%) higher education for consumers. This is in line with Madugu and Edward (2011). Who in that findings discovered that most of the fish marketer are literate, this implies that most of the respondents are educated as they had one form of educational background or the other. The results also revealed that (88%) of the respondents of fish producer are married, (64%) processors were married, (62%) marketers were married and (66%) consumers are also married. This is in agreement with the findings of Umoinyang (2014) who in his findings discovered that majority of fish actors are married. This indicate that fish production and marketing were the major source of livelihood to the participants in the value chain and their families. The results on household size revealed that the mean size for producers, processors, marketers and consumers was 6. This implies that there was a reasonable supply of family labour for the actors in the study area as majority of the respondents had relatively large families. This also implies that majority of the value chains are saddle with one family responsibility or the other and it also mean that family labour were readily available in the study area. However, it is contrast to Kainga and Adeyemo (2012) who reported that marketers had mean household size of 4. The results on experience revealed that the mean years of experience of producers were 5years, while that of the processors and marketers was 9 years, respectively. This implies that greater proportion of the respondents had an appreciable technique about fishing in the in the study area.



**Table 2:** Socio-economic characteristics of the actors

Characteristics	Producers		Processors Percentage		Marketers		Consumers	
Age								
21-30	6		22		15		15	
31-40	56	Mean 40	55		45		24	
41-50	27		12		30		45	
51-60	10		7		10		13	
61 and above	1		4		-		3	
Sex								
Male	72		32		21		61	
Female	28		68		89		39	
Education								
Primary	4		48		35		18	
Secondary	13		32		48		22	
Higher Education	45		15		12		50	
Adult Education	38		5		5		20	
Marital Status								
Single	5		26		30		22	
Married	88		64		62		66	
Widowed	7		10		8		12	
Household Size								
1-5	41		37		31		46	
6-10	52	Mean 6	50		62		50	
11-15	7		13		7		4	
Farming Experience								
1-5	43		30		16			
6-10	20		43		34			
11-15	9	Mean 5	10	Mean 9	40	Mean 9		
16-20	25		11		7			
21 and above	3		6		3			

### Costs and Returns Processing fresh fish to Dried/Smoked Fish

The cost and return associated with fish processing (fresh to dried or smoked fish), were investigated to ascertain the viability of the various cost components namely the variable cost items identified as shown in Table 3. The results revealed that the total variable cost for processed fresh fish to dried/smoked fish in dry and wet season was ₦1,533,223.53 and 1,633,390.20 per year, respectively. Cost of fresh fish comprised 90.89% and 88.28%, drum 1.67% and 1.57%, net 0.27% and 0.25%, basin 0.06% and 0.06%, firewood 0.47 and 0.44%, sack 0.11% and 0.10%, basket 0.30% and 0.28%, carton 0.09% and 0.09%, transportation 5.85% and 5.65% and labour 0.30% and 3.28% of the cost of fresh fish processing to dried/smoked fish in dry and wet season. The total revenue obtained per annum was ₦2,232,000.00 and ₦2,302,000.00. It was revealed that total variable cost accounted for 100%. This implies that variable costs were the highest cost of items in fresh fish processing to dried/smoked fish in both season in the study area. The results further showed that the gross margin in wet and dry season was ₦698,776.47 and ₦668,609.80 respectively. The return per



naira invested (RNI) was ₦1.46 and ₦1.41 which implies that fresh fish processing to dried/smoked fish in dry and wet season is a profitable enterprise in the study area since RNI is greater than one, thus agreeing with the works of Iliyasu *et al.* (2011), Adeosun and Adebukola (2012), Ebewore (2013), and Nwabueze and Nwabueze (2010), who also reported that marketing of processed fish was profitable if carefully managed. From the return per naira invested, it was observed that processing fresh fish to dried/smoked fish in dry season has the highest (RNI) of 1.46 compared to wet season which has RNI of 1.41.

**Table 3:** Processing fresh fish to Dried/Smoked Fish in dry and wet season

Variables Costs	Processed fish value (₦)	Percentage	Processed fish value (₦)	Percentage
Drum	25,678.00	1.67	25,678.00	1.57
Net	4,089.10	0.27	4,089.10	0.25
Basin	944.10	0.06	944.10	0.06
Firewood	7,191.00	0.47	7,191.00	0.44
Sack	1,653.00	0.11	1,653.00	0.10
Basket	4,535.00	0.30	4,535.00	0.28
Carton	1,450.00	0.09	1,450.00	0.09
Cost of 10kg Fresh fish	1,393,500.00	90.89	1,442,000.00	88.28
Cost of transportation	89,650.00	5.85	92,250.00	5.65
10kg smoked fish				
Cost of labour	4,533.33	0.3	53,600.00	3.28
Total variable cost	1,533,223.53	100	1,633,390.20	100
Revenue	2,232,000.00		2,302,000.00	
Gross Margin	698,776.47		668,609.80	
Return on investment	1.46		1.41	

### Costs and Returns Processing Fresh Fish to Roasted/Fried

The results of Table 4 revealed that the total variable cost for processed fresh fish to roasted/fried was ₦618,297.83 per annum. Cost of fresh fish comprised 90.57%, Knife 0.04%, basin 0.17%, basket 0.07%, firewood 0.14%, frying pan 0.29%, transportation 8.06% and labour 0.73% of the cost of fresh fish processing to roasted/fried fish. The total revenue obtained per annum was ₦1,034,500.00. It was revealed that total variable cost accounted for 100%. This implies that variable costs were the highest cost of items in fresh fish processing to roasted/fried fish in the study area. The Table further showed that the gross margin was ₦416,202.17. The return per naira invested (RNI) was ₦1.67 which implies that fresh fish processing to roasted/fried fish is a profitable enterprise in the study area since RNI is greater than one, thus agreeing with the works of Ebewore (2013), and Nwabueze and Nwabueze (2010), who also reported that marketing of processed fish was profitable if carefully managed.





**Table 4:** Processing fresh fish to roasted/fried

Variables Costs	Processed fish value (₦)	Percentage
Knife	250.1	0.04
Basin	830.1	0.17
Basket	415.1	0.07
Firewood	774.1	0.14
Frying pan	1645.1	0.29
Cost of 10kg fresh fish	560,000.00	90.57
Cost of labour	4,533.33	0.73
Cost of transportation 10kg smoked fish	49,850.00	8.06
Total Variable Cost	618,297.83	100
Revenue	1,034,500.00	
Gross Margin	416,202.17	
Return on investment	1.67	

### The Major Constraints Facing Fish Producers, Processors and Marketers

The participants in the value chain of fish were faced with many constraints ranging from inadequate capital, poor power supply, and high cost of transportation. According to Table 5, 68% of the producers were faced with inadequate capital while 42% and 44% of processors and marketers experienced the same issue. Fish is highly perishable if not properly preserved. The respondents were not exempted from these. Findings from this research revealed that 54% of the producers had poor storage facilities this is supported by the report of Madugu Edward (2011) who stated that fish farmers lack basic modern facilities to preserve fish for a longer period. Also 78% of the processors suffered poor storage facilities, thus the quantity process per time is limited and usually based on demands, and this has prevented rapid expansion consequently reporting of processed fish in Nigeria almost at zero level amongst the processors.

Furthermore, 63% of marketers complained of poor storage facilities. This can result into selling at lower prices than cost price just to prevent total loss. The buyers take undue advantage of this by waiting toward evening before purchasing when the sellers will not be willing to take the left over home due to poor storage facilities. High cost of transportation was another major constraint faced by the participants 58% of the processors and marketers battled with this, while 57% of producers faced the same issue. This high cost of transportation has impact on the total cost of production, enhance reducing the profit of the participants.

**Table 5:** Constraints facing Fish Producers, Processors and Marketers

Constraints	Producers		Processors		Marketers	
	*Frequency	%	*Frequency	%	*Frequency	%
Inadequate capital	77	68	47	42	50	44
Poor power supply	67	59		-		-
Inadequate feed	66	58		-		-
Mortality	62	55		-		-
Thief	33	29	43	38	39	35
Price instability	23	20		-	78	69
Poor storage facilities	61	54	88	78	71	63

\*Multiple responses

### CONCLUSION AND RECOMMENDATIONS



The study assessed the economics of fish value chains in Taraba State. From the study, it was discovered that the value chain has improved income earnings for participants, thereby improving their livelihood. Furthermore, studies showed that more young people are picking interest in fish farming production. Constraints faced by both participants are inadequate capital, poor power supply, inadequate feed, poor storage facilities and high cost of transportation. The study makes the following recommendation:

1. Formation of cooperative society by the actors for the provision of storage facilities
2. Establishment of special cool-room in the market for storage of fish, through the cooperatives and assistance from Government
3. Tax reduction by the government provision of loans to the marketers and vans for the transportation of fresh fish in good time in the study area.

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