Capture Fish Value Chain Study in Yobe State, Northeast Nigeria: A panacea for sustainable development

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Abstract

The study examined fish value chain in Yobe state Northeast Nigeria. Value addition, profitability, efficiency in marketing and structure of the fish markets were assessed using data elicited in 2023 from 640 respondents. Four Local Government Areas in the state (Bade, Geidam, Jakusko and Nguru) prominent in capture fish production were purposively selected for the study. Six major value chain actors were identified and value added per Kg of catfish (Clarias gariepinus) was higher for fish processors (319.3/Kg) while, processed fish marketers had highest marketing efficiency (321.8%). Similarly, raw fish marketers received the highest marketing margin (20.63%) and the gross margin for artisanal fishermen was 272.5/Kg and on average a total 22,891.8 per day. The study revealed that, products flow was less complex from fishing points to consumption and that the values of Gini Coefficient indicated a monopolistic completion in both fresh/raw fish and processor markets. Based on the above findings, it was concluded that fisheries sub sector in Yobe state had the potential of creating more employment opportunities, increase per capital income/GDP and sustained economic development. It was therefore recommended that, more effort should be intensified by relevant stakeholders to enhance the value addition at every node of the chain and there should be policy to maintain the existing fishing sites (rivers) and to also explore other potential areas.

Keywords: *Capture Fish, Value Chain, Sustainable Development, Yobe State*

I. Introduction

Fisheries are one of the major economic sectors in Nigeria contributing in terms of Gross Domestic Product (GDP). The sector is estimated to employ over 10 million people directly and a further 19.6 million indirectly[21,31]. Fishing industry in Nigeria comprises of three major subsectors – namely; the artisanal, industrial and aquaculture. The capture fisheries are dominated by the artisanal fish farmers (coastal and inland) and a significantly low contribution from industrial vessels and trawlers which basically are coastal fishers [23]. Nigeria produces over one million metric tons of fish in 2019 of which 74% was from capture fish (825,013 tons) and 289,543 tons from aquaculture [24,23]. More than 80% of this domestic production was generated by small – scale artisanal fishers [9]. Recognizing the importance of fish within the agriculture sector, the government of Nigeria has selected aquaculture and captured fisheries as one of the priority food value chains for expansion and development because of its potential to generate employment and income for a significant number of fishers, fish farmers and fish traders thus, alleviating poverty, improving food and nutrition security, and building profitable business ventures [9,31,13]

Accordingly, the federal government announced that, the number of Nigerians engaged in primary and secondary fish production across the country was over 10 million [26]. The sector therefore, is an important tool for rural development where most fish value chain actors are located and the relevance derived from the high demand for fish as the major source of protein in the country. Fish is an important part of the diet of many communities, there's also an increasing awareness of the health benefits of eating fish, actively supported by government through school feeding programme [11] and a large number of families earn a living along the value chain from fish farming and or fishing, fish processing and marketing. The fish value chain and value addition presents reasonable opportunity for additional revenue generation, job creation and effective post-harvest management as products follow down from the point of production to final consumer. Analyzing fish value chain both capture and aquaculture as opined by [20] provides an insight into various employment opportunities that remain barely untapped in the fisheries sub-sector.

Yobe state is among the major producers of fish in North east Nigeria, capture fish supply most of demand for domestic consumption. Artisanal fish production projection in Yobe in the year 2022 as reported by department of fisheries, federal ministry of agriculture was 11,750 and 16,250 tons for Catfish and Tilapia

respectively. In spite of these opportunities the Nigeria's fish industry underperformed perpetually over the years due to negligence of the sector by the government and other stakeholders. Despite huge number of fish farmers, the country was still importing about 2.5 million tons of frozen fish annually[26]. Majority of the operators along the sector's value chain are peasant with poor handling facilities, poor infrastructure and limited access to better markets and reduced profitability. The implication was a declining trend in household fish consumption which currently stood at 13.3kg/capita/year[24], significantly lower than the world average of 20.3 kg/capita/year [7,10]

In view of this, the study seeks to identify the major actors and their functions along the fish value chain, determine the value addition, marketing efficiency and margins of the actors and analyze the structure and conduct of the fish markets, with a view to make valid conclusions as to whether the sector is a solution for sustained economic development in Yobe state.

Theoretical Framework

[15,29] have been some of the leading thinkers on the concept of value chain analysis to determine industry competitiveness. In the late 1980's Porter produced his work on value chain for the firm showing inbound and outbound logistics. On the other hand, Gereffi and Kaplinsky's work (1994, 2000 and 2002) has made significant contribution on the study of global value chains. The concept of value chain consists of systemic conception of the economy based upon a disaggregated analysis of supply-demand relation, looking at multiple agents (individuals or institutions) coordinated interaction along a sequence of operations (upstream to downstream) where different inputs and services are combined to deliver a final output. It's a full range of activities that are required to bring a product (or service) from conception through different phases of production to delivery to final consumer and disposal after use [19,20,1]. A value chain, therefore, incorporates productive transformation and value addition at each stage of the value chain. At each stage in the value chain, the product changes hands through chain actors, transaction costs are incurred, and generally, some form of value is added. Thus, value addition results from diverse activities like bulking, cleaning, grading, and packaging, transporting, storing and processing. Bammann [8] has identified three important levels of value chain; Value chain actors: The chain of actors who directly deal with the products, i.e. produce, process, trade and own them. Value chain supporters: The services provided by various actors who never directly deal with the product, but whose services add value to the product. Value chain influencers: The regulatory framework, policies, infrastructures, etc.

In contrast, other definitions exist. Hobbs [16] defines the value chain as one particular form of the supply chain. In this approach, the supply chain refers to the entire vertical chain of activities: from production on the farm, through processing, distribution and retailing to the consumer – in other words – the entire spectrum, from gate to plate, regardless of how it is organized or how it functions. Hobbs' definition of supply chain is thus similar to Kaplinsky and Morris' definition of value chain. [16]Defines value chain as a vertical alliance or strategic network between numbers of independent business organizations within a supply chain. Thus, rather than value creation and sharing, emphasis is placed on the permanence of linkages among chain actors

II. Methodology

Study area

The study area for this research is Yobe State located in the North-eastern part of Nigeria. The state lies from Latitudes 11O 45"N - 13O 30"N of the Equator and Longitudes 9O 30"E - 12O 30"E of the Greenwich meridian. Agriculture is the mainstay for Yobe state economy employing over 80 percent of the population [22]. The state shares common boundaries with Borno State to the east and southeast, Jigawa State to the northwest, Bauchi and Gombe States to the southwest, while to the north is international border with Niger Republic. Annual average rainfall and temperature ranges between 423.3 mm and 34⁰ C respectively, hottest months in the state are March-May with temperatures of between 39⁰C - 44⁰C [6,4]. Yobe state has a total land area of 47 153 square kilometers of which 70 percent of the land area (33 007.1 square kilometer) is classified as arable land for agriculture[2]. The population of the state according to head count in 2006 was about 2.6 million and projected to be 3.65 million in 2022. Agricultural practices in the state are mainly rain-fed, majority of the farmers engaged in small scale subsistence farming with millet, sorghum, cowpea and maize as major food crops and gum Arabic, groundnut, sesame seed as cash crops. A significant proportion of the populations are pastoralists rearing livestock such as cattle, sheep, goats, donkeys while fisheries activities are purely artisanal fishing.

Sampling procedure

Multistage sampling procedure was adopted for the study. Based on reconnaissance survey, Four (4) Local Governments Areas (Bade, Geidam, Jakusko and Nguru) were purposively selected due to concentration of fishing activities. Simple random sampling was used to select 40 fishermen and 40 fresh/raw fish marketers

(wholesalers) from each local government. Two major forms of fish processing (Smoking and Frying) were common in the study area, forty fish processors and forty processed fish marketers (wholesalers and retailers) were randomly selected from each local government area to capture the value adding activities along the chain. The research used a total sample size of 640 respondents to achieve the objectives of the study.

Data collection

The study used primary data elicited from semi -structured questionnaire supplemented by verbal interviews and focus group discussions (FGD). Variables of interest include the socio economic profile of the respondents, costs, revenues, value adding activities, and channels which products followed along the nodes of the value chain.

Data Analysis

Analytical tools used in achieving the objectives of this study include; Descriptive statistics, farm budgeting models; marketing margin and efficiency, Gini coefficient and Flow chart analysis.

Specification of the Models

Gross Margin (GM) by definition is the difference between the gross income (GI) and the total variable cost (TVC) that is,

[30]

$=$, $=$. Price of fish ₦/Kg, $=$Quantity of fish (catches)

GM= Gross margin in Naira ₦/day of fishermen, GI= Gross income per day (value of catches per day), TVC= Total variable cost of fishing per day, which includes: Labour cost ₦/day, feeding cost ₦/day, Transportation cost ₦/day, Communication cost in ₦/day etc GM was calculated for fishermen.

Marketing Margin

Marketing margin refers to the difference in price paid for a commodity at different stages of the marketing system. It represents difference in price of a given commodity at different stages of time, form, place and possession as it moves from the primary producer to ultimate consumer [3,28]. Marketing margins were obtained as follows;

[3].

Where;

Marketing Efficiency

Marketing efficiency is the maximization of ratio of output to input and is the most frequently used measure of market performance

[30]

Where: ME=Marketing efficiency, VA=Value added by marketing, Cms= Cost of marketing services. Value added by marketing = price (in Naira) received by trader less price received by proceeding trader i.e. selling value less purchase price;

The costs of marketing services in naira of the traders include: Labour cost N/Kg, Transportation ₦/Kg, Cost of packaging ₦/Kg, Communication ₦/Kg, and Taxes ₦/Kg.

Gini Coefficient

The Gini coefficient was used to analyses the structure of the fish market across actors along the value chain. It is a measure of statistical dispersion depicting inequality of wealth or product distribution and degree of market concentration or structure that is, whether there is competition or monopoly.

Where: G =value of the Gini coefficient X = Proportion of market participants, Y = Cumulative of purchase/sells of fish by actors, $\sum$ = Summation sign. Gini coefficient equal to zero means there is perfect equality in size and distribution of buyers or sellers and 1 when there is perfect inequality in the market.

III. Results And Discussion

Value chain Actors

The fish value chain survey recognized many actors that performed different activities along the chain, notable key actors found in the study area include inputs suppliers, artisanal fishermen, fresh fish marketers, fish processors and processed fish marketers. Artisanal fishing was predominant and supplied more than eighty per cent of the fish demand. Aquaculture farming is practiced in the more urban areas in the state and was very few as at the time of this study.

Input Suppliers:

The input dealers in the fish value chain were involved in the sale of fishing equipment mostly assorted fishing gears, nets, hooks and threads of different sizes to the fishermen. These dealers are located in the urban markets and were private individuals who mostly raised their capital personally and were categorized into wholesalers and retailers supplying inputs to the fishermen at the normal market prices. Input dealers were concentrated in Geidam and Gashua receiving their supplies from Kano and Maiduguri. Other input suppliers recognized in the study area were the carpenters that supply woods and construct canoes/boats for the fishermen.

Fishermen

Artisanal fishing activities have dominated fish production in Yobe state, therefore function of fishermen were synonymous to producers as primary suppliers in this study. Fishing in the study area is a male domain and the mean age the fishermen were 33 years. Mean household size and average years of fishing experience were 6 and 15 years respectively. More than 60% of the fishermen belong to cooperative society implying an opportunity of bargaining power. Feluola [14] reported similar findings in six states of Nigeria. Table 2 indicated that, mean daily catch per unit effort of fishers at an average of nine hours in the study area was 84kg of catfish, Tilapia , Carp and others during peak period of harvest (October to December). Fishers in the study area operated either individually or in group depending on the activity. The group catch involved buying complete lake or portion of stream or dam from inhabitant of the area and the proceeds is shared proportionally.

Fresh/Raw Fish Marketers

These are wholesalers whose functions include assembling of fish at the river site. They purchased fresh fishes directly from the fishermen and sell to other actors along the chain. Fresh fish marketers were mostly male (93.2%) with mean age of 40 years and 17 years of business experience. Table 2 revealed that the marketers can handled an average of 109kg of fishes per day and have an annual mean income of ₦ 644, 156.1. Fresh fish marketers supplied fish within and outside Yobe state and seldom retail their stock as they do not own shop/warehouse for storage and preservation.

Processors

Fish processors are those actors who added value to fish by transforming it into various products. They received fish majorly from fresh fish marketers as well as directly from fishermen. Processors also functioned as marketers and were involved in wholesaling and retailing activities. Fish in the study area were mostly processed traditionally into 3 forms; smoked fish (43%), fried fish (52%) and dried fish (5%). Catfish was majorly smoked while Tilapia, Carp, Pebbly and others were fried. Processors in the study area used mud-type, drum-type, pit oven and frying pans for fish processing, [25] reported similar processing methods. From table 2 the mean age of processors were found to be 40 years with average household size of 9 and 20 years of experience in the value chain. About 80% were male with average annual income of ₦ 551,752.5 processing 60.05kg of assorted fish everyday into smoked, fried or dried products.

Processed Fish Marketers

These are marketers that sell processed products to consumers. Some of them performed processing activities while others buy the products from processors for marketing. Twenty five per cent of the respondents in the study area were female while 75% were male (Table 2) with mean age of 45years. Mean household size and years of experience in business were 9 and 20 years respectively, indicating adequate knowledge and ability to strive and contend market imperfections (Table 2). Those traders sell their products in bulk within and outside Yobe state to consumers. Retailing activities by processors was done at the fish processor's markets, few retailers locate consumer's place of work, restaurants, shops or motor parks. Accordingly, female marketers were mostly unmarried girls who hawk the products from point to point locating their customers. Average annual income of these marketers was ₦730,625.00 handling on the average about 91.2Kg per day of processed fishes of different sizes.

Table 1: Socioeconomic characteristics of respondents

Variable	Fishermen		Processors		Fresh fish Marketers		Processed fish marketers	
	Freq	*%*	*Freq*	*%*	*Freq*	*%*	*Freq*	*%*

Sex								
Female	0.0	0.0	32	20.0	11	6.8	40	25.0
Male	160	100	128	80.0	149	93.2	120	75.0
Marital status								
Single	34	21.3	19	11.9	24	15.0	12	7.5
Married	126	78.7	141	88.1	136	85.0	148	92.5
Education								
Quranic	62	38.8	40	25.0	30	18.8	47	29.4
Primary	54	33.8	48	30.0	53	33.1	56	35.0
Secondary	34	21.2	44	27.5	59	36.8	34	21.3
Tertiary	10	6.2	28	17.5	18	11.3	23	15.6
Coop society								
Yes	97	60.6	104	65.0	62	38.7	102	63.7
No	63	39.4	56	35.0	98	61.3	58	36.3

Source: Field survey, 2023

Value Addition along the Chain

The value added of an actor in the chain is the price differential of the value-added product sold to the subsequent actor and the price the primary product acquired from the preceding actor [17]. Artisanal fisheries value addition in Yobe commences with the fishermen when catches is made after procurement fishing inputs suppliers. Fishermen value addition was in form of place utility and in some cases also concerned with primary assembling. Raw fish marketers who were wholesalers of fresh fish, added value through packaging and transportation from the point of catch (rivers, lakes or fresh fish markets) to fish processors. Value adding activities were more for processors as fish is transformed into various products like smoked, fried and dried fishes using different fixed and variable resources. Processed fish marketers added value through storage and packaging as their major activity was retailing. Table 4 showed value addition, marketing margin, marketing efficiency, percentage share of total value added and percentage mark up for different actors along the chain.

Value added by fresh fish marketers per Kg of catfish was ₦ 180. 86, it was the difference between average purchased cost from fishermen (₦ 359.31/Kg) and the average price paid by the processors (₦ 540.17/Kg). Value added by fish processors was found to be ₦ 319.3/Kg and was the price sold to processed fish marketers (₦ 859.47/Kg) less cost incurred in purchasing from raw fish marketers (₦ 540.17/Kg). Processed fish marketers value added was ₦ 278.01 per kg as a result of place and time utilities. Total value added by marketers along the chain was ₦ 778.17 per Kg. Table 4 also depicted the percentage share of the total value addition along the chain, Processors had the largest percentage share of the total value addition on catfish in Yobe state (41.03%) compared with fresh fish and processed fish marketers who had percentage share of 23.24 and 35.73% respectively. Igwenagu [17] found out that, the total value added along the chain in Imo state was ₦ 2,944.5/kg with value added share of 0.41%, 15.54%, 28.83% and 59.22% for input suppliers, fish producers, processors and marketers respectively.

Marketing Margin and Marketing Efficiency

Table 3 presented the marketing margin and marketing efficiency of the value chain actors, fish processor had marketing efficiency of 103.69% while, raw fish and processed fish marketers had marketing efficiency of 260.45% and 321.8% respectively. The marketers have higher marketing efficiency even with lower value addition, because they incurred proportionately less costs in marketing their products. In terms of marketing margin, processed fish marketers had the highest absolute margin (187.48) followed by fresh or raw fish marketers (111.42). Absolute margin is the difference between volume of sell and total costs incurred in acquiring one Kg of catfish (purchased price plus cost of marketing). Fresh fish marketers have higher per cent margin (20.69%) and percentage mark-up (31.01%), indicating higher reasonable return with respect to selling price, costs of purchase and marketing services. Fish processor received the lowest percentage margin and percentage mark-up margin respectively (1.33 and 2.11%).

Table 3. Catfish value added by marketers along the chain in ₦/Kg

Actor	Selling Price/Kg	Purchase Price/Kg	CMs	Value Added	% share of VA	ME (%)	Ami	% Mi	% Mup
Raw fish marketers	540.17	359.31	69.44	180.86	23.24	260.45	111.42	20.63	31.01
Fish Processor	859.47	540.17	307.91	319.30	41.03	103.69	11.39	1.33	2.11
Processed fish marketers	1137.47	859.47	90.52	278.01	35.73	321.8	187.48	16.48	21.81

Source: Field survey 2023. Note: MMs - cost of marketing services, ME- marketing efficiency, Ami - absolute margin, %Mi - percentage margin and %Mup - percentage mark up

Gross Margin of Fishermen

Table 4 revealed the gross margin of fishermen in the study area. Artisanal fishing in Yobe state is dominated by manual fishing using canoe and local guard and this warrant the application of gross margin analysis since fixed cost components are very negligible compared to the variable costs. The gross margin per day (average of 8 hours fishing) of the fishermen was found to be ₦ 22,891.80 implying profitability of the business. Gross margin per Kg of catfish was ₦ 272.52 while, hired labour (31.7%) that assist in fishing and transportation cost to fishing sites and fish markets (27.82%) constituted higher proportion of the variable costs. Olagungu [6] also reported profitability of catfish farming in Nigeria's capital territory by small scale producers. Similarly, Adebayo [5] study fish value chain in Yola area of Adamawa State and found out that, processors made the highest margin of N 998.39/kg higher than fish farmer and fresh fish marketers who obtained 495.04/kg and N459.2/kg respectively. Value added by processors includes fish smoking, frying and sun drying.

Table 2. Descriptive statistics of variables

Variables	Fishermen				Raw/Fresh fish marketers				Processors				Processed fish marketers			
	Mean	Stdev	Kurtosis	Skewnes	Mean	Stddev	Kurtosis	Skewness	Mean	Stddev	Kurtosis	Skewness	Mean	Stdev	Kurtosis	Skewness
Age	33	7.8	0.05	0.37	39	9.98	-1.16	0.20	40	9.6	0.33	0.02	45	12.8	-0.77	-0.35
Household size	5.0	3.5	0.25	0.49	8	7.2	-0.59	0.41	9	6.1	0.79	1.06	9.0	5.7	-0.43	0.63
Experience in Business	16	7.1	0.34	0.73	17	7.1	-1.1	0.41	20	9.1	-0.1	0.5	21	11.5	-0.9	0.43
Qtty handle Kg/day	94	41.4	-0.15	0.75	109	53.1	1.51	1.36	60.1	30.1	-0.8	0.5	91.2	63.6	0.65	1.03
Annual income (₦)	696125	365799	1.89	1.30	6441565.1	3585	4.38	1.61	551762.5	335331	-1.2	0.2	7306625.0	6422832	0.65	1.22
Purchase cost (₦)/Kg	-	-	-	-	359.31	342.7	0.08	0.03	540.2	413	0.02	0.58	859.47	753.7	0.33	0.02
Selling price (₦)/Kg	359.31	101.3	0.05	0.01	540.17	533.1	0.09	0.02	859.47	571.8	0.02	0.03	1137.47	843.4	1.02	0.09

Source: field survey 2023

Table 4. Gross Margin for fishermen

Variables	Amount (₦)	% of TVC
Revenue Components:		
Sells per day (84x359.31)	30,451.52	
Variable Cost Components:		
Transportation	2,103.33	27.82
Feeding	1280.67	16.94
Hired labour	2,396.67	31.70
Sacks	433.33	5.73
Levy charges	500.00	6.61
others	845.72	11.19
Total Variable Cost	7,559.72	
Gross Margin/day	22,891,80	

Gross Margin/Kg	272.52	

Source: Author's computation from field survey 2023

Flow Chart Analysis

Fig.1 presented the fish value chain flow chart in the study area, artisanal fishermen who played the role of producer supplied 80% of the fish directly to fresh fish marketers, 15% is sold to fish processor and 5% goes directly to consumers. About ninety per cent of the fish handled by fresh fish marketers who are wholesalers goes directly to processors while 10% is purchased by consumers. The flow of processed products had short channel. 70% of the products are sold to consumers through retail, while 30% is sold as wholesale to processed fish marketers which were then channeled to final consumers.
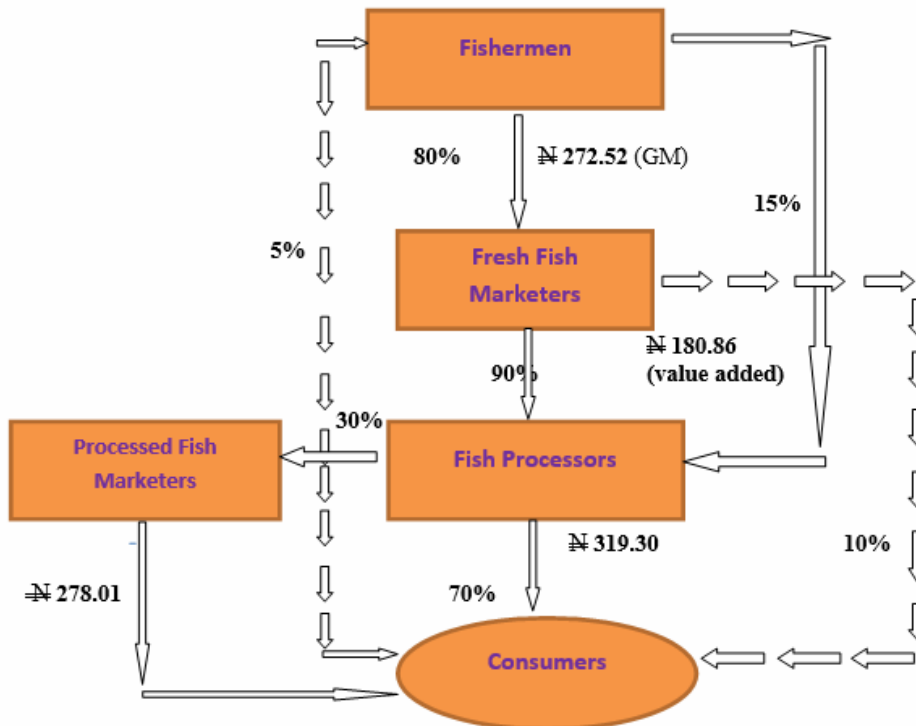

Fig.1 Flow chart showing proportion of fish flow and value added in Yobe state.

Structure and Conduct of the Fish Markets in Yobe state

The structure of the fish markets in Yobe state was analysed based on the volume of sales and income using Gini coefficient. Table 5 presented the results for fresh fish markets having a Gini coefficient of 0.798 (79.8%). This figure indicated that there was a level of inequality among the marketers ostensively due to difference in volume handle by traders, and availability of capital. The markets exhibited characteristics of Monopolistic Competition as there were many buyers and sellers and fishes were of different species, sizes and colour. Similarly table 6 revealed the structure of the fish processor markets, Gini coefficient was also found to be high (0.842) suggesting existence of inequality among the processors. Products in these markets were differentiated yet they are close substitutes to one another, there were many buyers and sellers with no barrier to entry and exit thus- characteristics of monopolistic market. High Gini coefficient value was probably due to disparity in income and market share. Comparing the two markets therefore, processor markets presented more inequality among actors than the fresh fish markets, implying high degree of monopolistic competition.

Table 5. Gini Coefficient for Fresh Fish Markets

Volume of sales (Kg)	No of marketers	Proportion of marketers (X)	Cumulative proportion	Total income from sells	Proportion of sells (Y)	Cumulative Proportion	XY
30 – 50	21	0.13125	0.13125	734,000	0,07431	0.07431	0.00975
51 – 70	11	0.06875	0.20	1,091,000	0.11545	0.18976	0.07937
71 – 90	25	0.15625	0.35625	1,039,000	0.10518	0.29494	0.01643
91 – 110	40	0.25	0.60625	1,490,000	0.15084	0.44578	0.02356
111 – 130	40	0.25	0.85625	2,399,000	0.24286	0.68864	0.06071

131 – 150	5	0.03125	0.8875	540,000	0.05467	0.74331	0.00171
151 – 170	3	0.01875	0.90625	210,000	0.02126	0.76457	0.00039
171 – 190	2	0.0125	0.91875	385,000	0.03898	0.80355	0.00048
191 – 210	5	0.03125	0.950	360,000	0.03644	0.83999	0.00114
>210	8	0.05	1	1,630,000	0.16501	1	0.00821
	160	1		9,878,000	1		0.20175

Source: Author's computation,

Table 6. Gini Coefficient for Processor Markets

Volume of sales (Kg)	No of marketers	Proportion of marketers (X)	Cumu proportion	Total income from sells	Proportion of sells (Y)	Cumulative Proportion	XY
20 -30	26	0.1625	0.1625	861,000	0.10693	0.10693	0.017376
31 -40	42	0.2625	0.425	1,973,000	0.24503	0.35196	0.064320
41 -50	7	0.04375	0.46875	227,000	0.02819	0.38015	0.001233
51 -60	31	0.19375	0.6625	1,768,000	0.21957	0.59972	0.042540
61 -70	5	0.03125	0.69375	438,000	0.05439	0.65411	0.001099
71 -80	13	0.08125	0.775	883,000	0.10966	0.76377	0.008910
81 90	3	0.01875	0.79375	151,000	0.01875	0.78252	0.000352
91 -100	18	0.11250	0.90625	1,270,000	0.15772	0.94024	0.017740
101 -110	4	0.0250	0.93125	131,000	0.01626	0.9565	0.001219
111 -120	11	0.06875	1	350,000	0.04347	1	0.002988
	160	1		8,052,000	1		0.15778

Source: Author's computation,

IV. Conclusion and Recommendations

The study revealed that, key fish value chain actors in the study area include inputs suppliers, fishermen, marketers (raw and processed), processors and consumers. Fish farmers and transporters existed in the chain but were not captured by this study. Value adding activities started when artisanal fishermen made catches and sold to raw/fresh fish marketers, the chain continues until fish is consumed. Value added by processors was higher along the chain, marketers also made appreciable value addition, while fishermen had gross margin of N 22,891,80 per day (N 272.55/Kg) indicating sustainability of the business. Fish processor had marketing efficiency of 103.69% while raw fish and processed fish marketers had ME of 260.45% and 321.8% respectively. Higher marketing efficiency by traders even with lower value addition indicated minimization of costs in marketing of products. Fish value chain in the study area has moderate channels as products travelled down to consumers. The structure of the markets was marked by many buyers and sellers, differentiated products and inequality of income across categories of actors thus, revealing characteristics of monopolistic competition. Based on the above, it was concluded that fisheries sub sector in Yobe state had the potential of creating more employment opportunities, increase per capital income/GDP and overall sustainable economic development. It was therefore recommended that, more effort should be intensified by relevant stakeholders to enhance the value addition at every node of the chain and there should be policy to maintain the existing fishing sites (rivers) and to also explore other potential areas.

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