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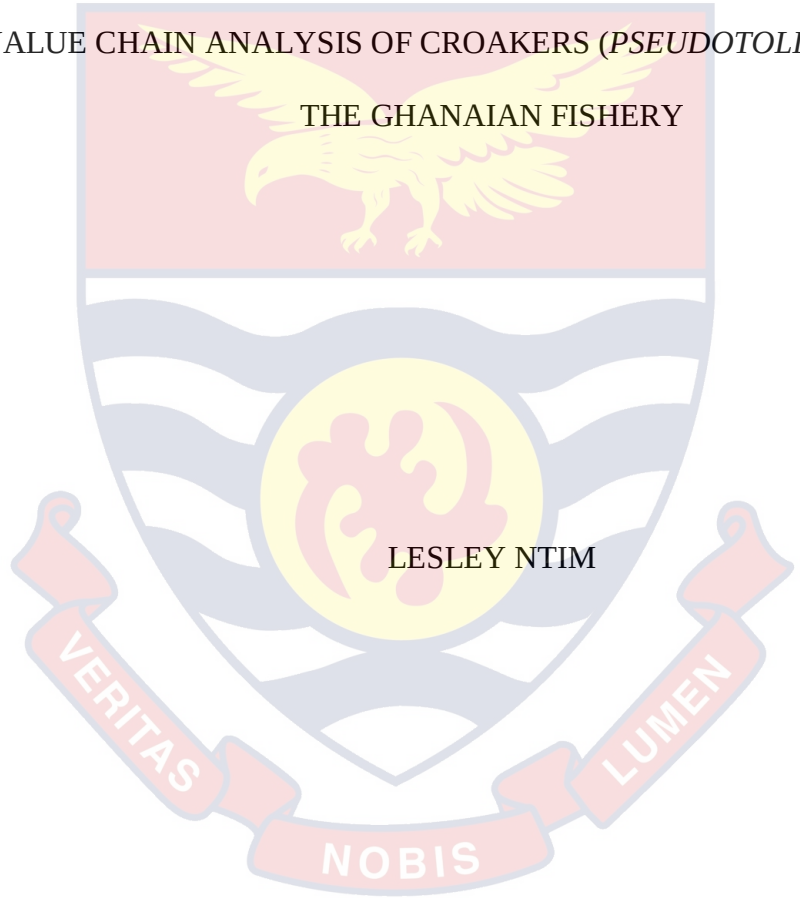
VALUE CHAIN ANALYSIS OF CROAKERS (*PSEUDOTOLITHUS* SPP.) IN THE GHANAIAN FISHERY



LESLEY NTIM

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VALUE CHAIN ANALYSIS OF CROAKERS (*PSEUDOTOLITHUS* SPP.) IN THE GHANAIAN FISHERY

BY

LESLEY NTIM

Thesis Submitted to the Department of Fisheries and Aquatic Sciences of the School of Biological Sciences, University of Cape Coast, in Partial Fulfillment of the requirements for the award of Doctor of Philosophy Degree in Integrated Coastal Zone Management

JANUARY 2021

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original work and that no part of it has been presented for another degree in this University or anywhere else.

Candidate's Signature…… Date……

Name: Lesley Ntim

Supervisors' Declaration

We hereby declare that the preparation of this thesis was supervised in accordance with the guidelines on supervision of theses laid down by the University of Cape Coast.

Principal Supervisor's Signature …… Date……

Name: Prof. Denis W. Aheto

Co-Supervisor's Signature…….. Date……

Name: Prof. John Blay

ABSTRACT

This study was undertaken to assess the economic value of croakers (*Pseudotolithus* spp.) in the fishery of the Central and Western Regions of Ghana. Investigations were conducted from January 2017 to August 2018, involving collection of data from both primary and secondary sources. Primary data were obtained from 300 fishermen, 230 fish processors and retailers, 45 wholesalers, 40 middlemen, and 40 consumers using qualitative and quantitative research methods. The data were analysed using SPSS version 22 and Excel 2013. Profitability analysis showed that fish processors were the dominant actors in the value chain with those at Sekondi recording higher profit margins and a Return on Investment (ROI) at year 17. Positive Net Present Values (NPV) were recorded for the fishery, depicting the industry as profitable. Sekondi recorded annual values of $35,154.00 for fishermen, $135,331.53 for processors, $48,170.00 for wholesalers and $69,292.00 for retailers. The ROI also suggested that the industry required between 17 and 30 years for the croaker business to break-even, which is the point at which the volume of sales will result in no net income or net loss on the actors' income. A linear regression analysis showed that the croakers contributed more than 55% of the income of fishermen. Some constraints identified in the chain were difficulty in accessing credit, lack of cold storage facilities, and health challenges (among the processors). Opportunities identified within the croaker fishery included; employment, high demand and ready market for the croakers. Enhancement of capacity for operators in the value chain is

recommended to address the current issues facing the chain actors, and to provide a chain upgrade.

KEYWORDS

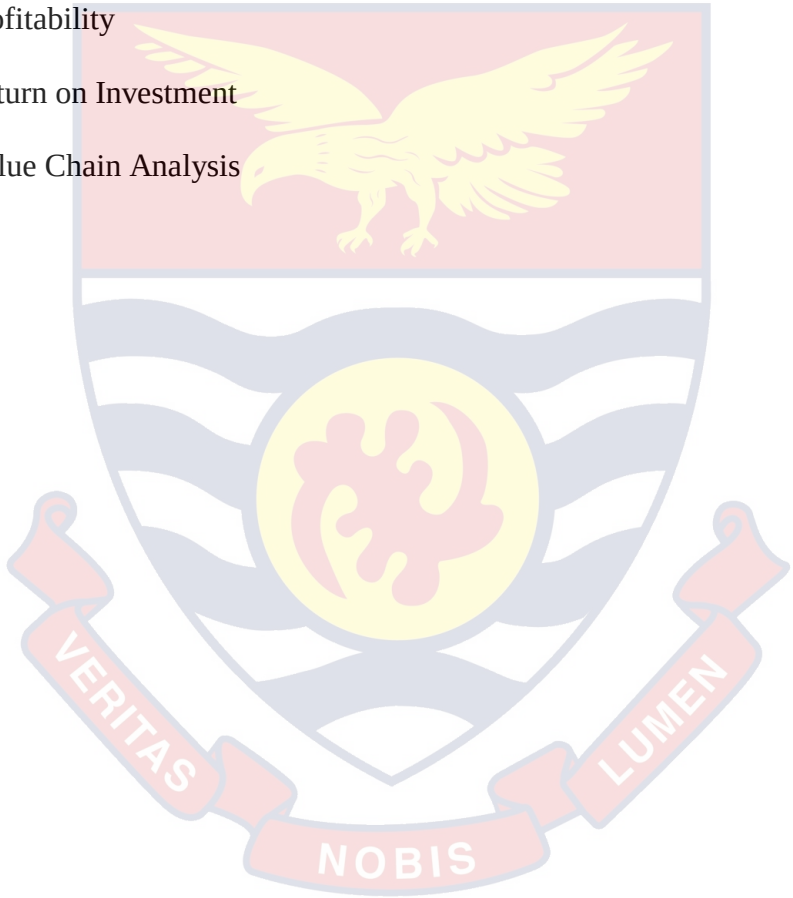
Croaker Fishery

Net Present Value

Profitability

Return on Investment

Value Chain Analysis



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DEDICATION

To the Danquah boys, my family, friends and admirers.

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LIST OF ACRONYMS

CEWEFIA	Central and Western Fishmongers Improvement Association
CF	Credit Facility
DFI	Designated Finance Institutions
EDIF	Export Development and Investment Fund
EDPA	Export Development and Promotion Accounts
EPA	Environmental Protection Agency
FC	Fisheries Commission
GEPC	Ghana Export Promotion Council
GoG	Government of Ghana
HACCP	Hazard Analysis and Critical Control Points
MOFAD	Ministry of Fisheries and Aquaculture Development
MOTI	Ministry of Trade and Industry
NGO	Non-Governmental Organisation
SFMP	Sustainable Fisheries Management Project
SME	Small and Medium Enterprises

UCC	University of Cape Coast
USAID	United States Agency for International Development

CHAPTER ONE

INTRODUCTION

Background of the Study

According to the European Commission (COM, 2000), Integrated Coastal Zone Management (ICZM) is a complex, multidisciplinary and iterative process to promote coastal areas' environmental maintenance. The coastal zone is a unique geological, physical, and biological area of vital economic and environmental value as well as management of inhabitants and coastal resources (Byrnes et al. 2004a). Solving the dynamic management challenges in the coastal region is a resource management framework following an integrative, comprehensive strategy and an interactive development method (Thia-Eng, 1993). It covers the complete cycle of gathering of information, processing of the information (in its broadest sense), decision-making, management, and execution control. It uses the engagement and collaboration of all parties to determine the societal goals of the coastal region and to take the action plan required to accomplish those objectives (COM, 2000).

ICZM also aims at juggling environmental, fiscal, social, cultural and recreational goals, all within the boundaries defined by natural complexities whiles incorporating all related policy areas, industries, and levels of administration. One of the important linkages between the coastal population and the management of local economic resources is through a value chain assessment of the resources.

A value chain is the broad spectrum of actions needed to get goods or services to final consumers from production, across the multiple stages of manufacturing, transformation and distribution. The study of the value chain attempts to describe how chain processes are carried out and to explain how value is generated and exchanged amongst members of the chain (Kaplinsky and Morris, 2000). Although there is no single systematic description for value chain of fisheries, general features and meanings have been used to define the value chain of fisheries (FAO, 2014). The fisheries value chain has core operations, which provide a variety of goods and services supplied by integrated players in the supply chain of fisheries, with a number of value adding activities along the chain from the manufacturing stage to the transportation of the goods aimed at delivering better items for the consumers and higher income for the enterprise.

Value chain is a business-oriented model that shows the full range of on-fishing and off-fishing activities that create the final product offered to the consumer. The chain is supported by a conducive environment, which includes financial institutions and information support such as extension services. The institutional arrangement also links producers, processors, traders and distributors of the products and coordinates them.

The Concept of Value Chains

Globally, value chains have been effectively used in many countries to manage fisheries and fisheries' resources through research (FAO, 2006). For example, value chain was used in European countries to study the marketing

chain for processed herrings in relations to the market demand of nearby countries. Various processing methods were examined along the chain, of which salted herring was identified as the most important product in the chain. The total value-added along the chain, the total revenue over the years and the total turnover of the fishery industry were also estimated through value chain analysis (FAO 2006).

Value chain has also been used to boosts production capacities and enhanced policy formulation. For example, Alemu & Azadi, (2018), used organised surveys in value chains in Ethiopia, to examine the incentive of household fishing and to determine the effects of fisheries on the subsistence fishermen, and wellbeing of the households. The recommendations aided in capacity building which culminated in increased participation of households in Ethiopia's fishery business. The efficiency of cooperatives was also improved by the provision of fishing vessels, refrigerators, fishing nets and other office supplies by the government and some non-governmental organisations. Demand access and access to support also pushed fishermen to fish, resulting in a substantial increase in the income of fishing households, which was higher than that of non-fishing households. The findings also showed that there were lower income differences among cooperative fishing households relative to private fishing households.

Also in Tanzania, records on value chains have been used to determine price changes in the Nile Perch of the Lake Victoria over the years. The market demand of the species was becoming too excessive and a recommendation was

made on its management (FAO, 2006). Again, the operations of individual fishermen were constrained by the fact that they had no preservation facilities and therefore, delayed in sales could lead to low-quality fish, which implied lower prices. Independent fishermen could also have their day when there was a shortage of fish while fishermen "contract" work at the agreed prices (FAO, 2006). This depicts that, as analysis is done along the chain, constraints are brought to bear for redress.

Value chain analysis can reveal linkages, performance and show results along the chain. O'Neill et al. (2018) used a case-study approach to analyse relevant social and economic factors at the local level to better understand how the global seafood industry operates in a low-income country. Investigations were done on how Ghana's industrial tuna fishery operates in terms of procedures, practices, governance and finance. Market structures were evaluated, sales pathways and distribution of revenue, as well as the role of actors involved in the industry were investigated, a value-chain framework was then adopted. The results revealed a shifting organisational structure in the production of tuna, moving from bait-boat fishing with smaller companies to large-scale purse-seine fishing with the support of consolidated Asian seafood companies. It was found that production depended substantially on local female intermediaries and access to funds through pre-financing.

Nunoo et al. (2015) investigated Sardinella and other small pelagics using value and supply chain research in a study in Ghana. The study evaluated the relationships between actors and value addition options. The study recommended

that performance be improved along the value chain and that management strategies be developed to rebuild small pelagic stocks. Value chain analysis (VCA) is therefore ideal for finding and addressing constraints and making policy decisions.

Gender integration and analysis is also an important component of value chain analysis. Gender is conceptualised as the difference between women and men that is socially constructed (Kabeer, 1999). Sex, then, is about how culture gives meaning to variations in femininity and masculinity, as well as the resulting power structures and interactions (Laven et al. 2009). Empowerment is one of the critical components of the labour and value chain. Understanding the role of women in the value chains and promoting women's empowerment is a concern that also affects men and therefore necessary to remain attentive to such local issues, that may challenge or promote gender empowerment (Parpart, et al.; 2002 Wyrod, 2008).

The methodology of value chain analysis is known to be a method that can determine the factors which drive global trade benefits and measure to what extent populations most at risk from economic depressions are gaining from entry to the worldwide seafood trade (O'Neill et al. 2018). A VCA does not tell the whole story of an industry but it provides an important insight, with traditional analysis of industrial sectors more than often. The dynamic linkages that may be outside a certain sector or perhaps of an informal nature can be missed with traditional straightforward sectoral analysis (Kaplinsky & Morris, 2002).

The value chain works hand in hand with the supply chain. The system and resources used to transfer a product or service from supplier to customer are referred to as a supply chain. It is a sequence of processes involving decision making and execution and flow of materials, information and money that aims to meet the customer's final requirements that takes place within and between different stages along a continuum, from production to final consumption (FAO, 2014). According to FAO (2007), the supply chain does not only include the producer and distributors, but depends on transporters, warehouses operators, retail services, and consumers. Product development, marketing, operations, distribution, and finance are also included. The whole range of processes and practices needed to manufacture a product and then export it to the target market is the fish supply chain. The chain involves harvesting fish, processing in various ways and distribution to the consumer. The value chain concept builds on this to also consider the manner in which value is added along the chain, both to the product / service and the actors involved. Value chain involves both internal and external stakeholders who work together to bring value creation. The whole business model can be displayed by value chain mapping.

The value chain is the entire set of procedures and actions necessary to create and then deliver a product to the target consumer. Value chain when mapped, reveals a schematic view of all the actors involved in the chain and the different ties in the work of the value chain. Value chain map promotes a good view of the sequence of events and the main actors and partners involved in the value chain, according to UNIDO (2009). This exercise is carried out in

qualitative and quantitative terms from before production where different actors on the chain supply inputs for processing and marketing. This step allows an understanding of the characteristics and relationships between the actors, including the evaluation of chain actors, the movement of goods along the chain, the characteristics of work, and the destination and quantity of sales. In the fishing field, the value chain is very vital. This encourages the company to figure out how to achieve the highest possible benefit for customers and the best way to increase profit. Branding is essential as it offers producers much returns, and provides clients with the best product. As a result of increased good handling and proximity to customers, post-harvest and output losses are reduced.

Analysis of the value chain helps to recognize the features of the players in the chain and the interactions between them and the movement of goods across the chain, the characteristics of the work and the final destination. Torres et al. (2017) wrote that study of the value chain leads to finding opportunities for change in order to create greater productivity for public agencies by creating an alignment between the policy of the company and its operations. In bridging the gap between the emphasis of conventional economics on aggregate, poverty measures such as income levels and the stress of livelihood perspectives on micro-level uncertainty evaluating value chains is critical (Kanji and Barrientos, 2002). The value chain of fisheries takes into account fish producers, processors, traders and consumers.

Fisheries in Ghana

Abundant fishery services are produced from the Ghanaian waters (Mensah & Quaatey, 2002; Mehl et al. 2004; Mehl et al. 2005). Fishery resources in Ghana have long been a backbone of the national economy, contributing significantly to its socio-economic growth and accounting for 60% of the animal protein consumed in Ghana (FAO, 2014). The fisheries industry produces over US$1 billion in sales per year according to Bilijo (2014), and accounts for at least 4.5 percent of Ghana's Gross Domestic Product (GDP). The sector also provides livelihoods for an estimated 2.4 million individuals, or 10% of the population in Ghana, who, including their dependents, are directly or indirectly employed. Many people depend on fisheries resources for their livelihoods, including boat owners or canoe owners, fishermen, fish traders of all sorts for direct employment and other work provided to other people by them (FAO, 2014). On average, Ghanaians consume about 20-25 kilogrammes of fish annually, which is 13 kilogrammes higher than the world average (Ghana Statistical Service (GSS), 2008). Approximately 75% of the overall fish supply is locally consumed (Bank of Ghana (BoG), 2008; FAO, 2014).

Fish consumption plays a crucial role in the supply of animal protein and human requirements of micronutrients worldwide. On average, export earnings from fish and fish products contribute to approximately USD 60 million annually (FAO, 2014). There are three major sectors of the marine fishing industry in Ghana: artisanal, inshore or semi-industrial; and industrial (Koranteng, 1998; Minta, 2003; FAO, 2007). The artisanal fishery contributed 71% of total fish landed between the years of 2000-2010, tuna and other industrial vessels landed

26.1%, and inshore vessels landed 2.8% of the catch over the same period (Antwi-Asare & Abbey, 2012). The small pelagics (sardinellas & anchovies) are the major species landed by marine fisheries, while the significant demersals are the seabreams, groupers and croakers. The croakers are important food fish and are the most commonly observed sciaenidae in the West African waters (Nunoo et al. 2015). It is the most commercially valuable demersal fish in West African waters and forms up to about 70 percent of the total sciaenid population surveyed by the RV Fridjoft Nansen (Nunoo et al. 2015).

The two species of croakers being studied along the value chain in the sciaenidae family for this research are *Pseudotolithus senegalensis* (Valenciennes, 1833) commonly called cassava croakers and the *Pseudotolithus typus* (Bleeker, 1863) also called longneck croakers, these two species are common in the Ghanaian waters. The sciaenids are caught with bottom trawl nets, bottom set nets and beach seines on muddy and sandy bottoms using hook & line. Sciaenids are exploited in Ghana by the sub-sectors of artisanal, semi-industrial and industrial fisheries. It is harvested in the four main coastal areas, namely the Volta Region, the Central Region, the Greater Accra Region and the Western Region of Ghana.

Sciaenids are present in the coastal shoreline over muddy bottoms up to a depth of about 50m. They also join estuaries and coastal lagoons between December and February, and move further offshore to about 100m for spawning. The median growth size is 45cm but it is normal to have 35cm in size, while the mean body sizes for the sciaenidae are currently about 25-30cm (Nunoo et al. 2009). During the 1989-90 period they were over 50cm based on trawl surveys

(Nunoo, 2015). The total catch reported to FAO for 1999 was 6,679t. Guinea (2,142t) and Cameroon (1 900t) were the countries with the highest captures, and were marketed raw, dry, salted and smoked (Nunoo et al. 2009).

In Africa, the species can be found from Morocco to Namibia, Cape Verde Islands, and in the East Atlantic. The species are the most economically significant demersal fish in the waters of West Africa. The most common sciaenids on the market in the region are *P. senegalensis, P. mbizi, P. typus, P. elongatus* and *P. senegallus*, in that respective declining order, with the remainder representing a total of less than 10% by weight in landings (Nunoo et al. 2009).

The flesh of the sciaenids, especially in the hospitality industry, is popular among consumers. Large-sized sciaenids are exported for foreign exchange, and because of its high demand, the prices of croakers on the market are also noted to be moderately high (personal communication with the Chief fisherman of Elmina, 2017). In the Ghanaian waters, croakers are significant fish species with a considerable contribution to food and job security along the value chain. The contribution of croakers to the capture fisheries in Ghana from 1975 to 2013 is shown in Figure 1. The peak of the harvest was recorded in 1990 and 1991 and this was between 5400 tonnes and 6000 tonnes respectively whiles the least quantity was recorded in 1980.

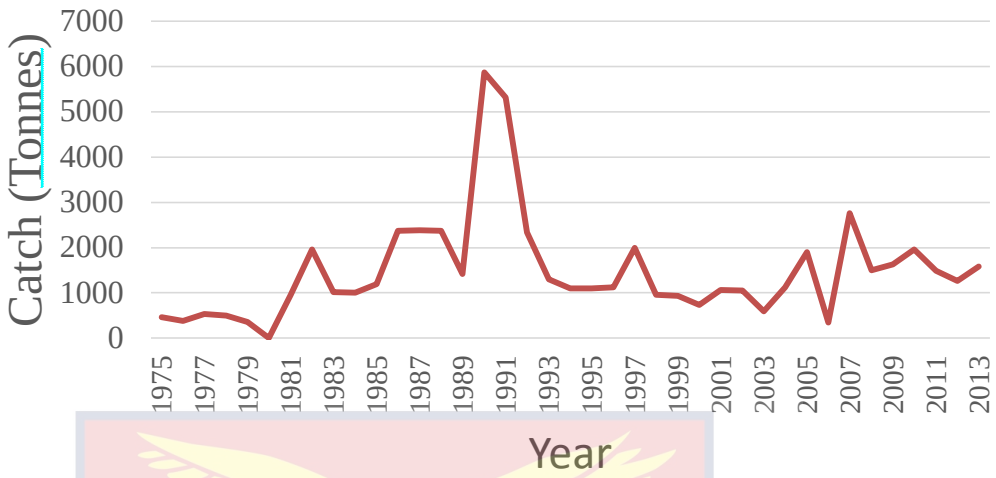


***Figure 1*: Catches of Cassava Croakers in Ghana from 1975 to 2013 (metric tonnes)**

Source: 2013 Data (Fisheries Commission)

The marine fisheries of Ghana include numerous fish species dominated by both pelagic and demersal species. Round Sardinella and Anchovy dominate the artisanal or canoe capture, whereas trawler catches include Cassava cod, Croakers, Sea Breams and Burrito in greater quantities (Antwi-Asare & Abbey, 2011).

Croakers are found from Senegal to Gabon along the West African coast, where they are exploited by both artisanal and industrial fisheries (Löwenberg and Künzel, 1991; Sylla, 2017). The majority of these species are also captured in the region's shrimp fishery as by-catch. In Côte d'Ivoire *P. senegalensis* constitutes 9-10 percent of the 40 species and are landed by the demersal trawlers (FAO, 2008). Sylla (2017) indicates that there is a high demand for all the species across West Africa. According to Colin (1988), coastal upwelling happens seasonally along the shoreline from July to October (the main event) and from January to February

(the minor event). Wehye et al. (2017) also observed that the two species spawn twice in a year from March to May and from October to December. In Ghana, it is reported that the croakers are among the dominant species harvested by the artisanal or canoe catch (Antwi-Asare & Abbey, 2011). Table 1 below shows the species and quantities of harvest from 2000 to 2010.

Table 1: Quantity of cassava fish relative to other fish stocks in the inshore fishery output by trawlers (tonnes) from 2000 to 2010

TRAWLERS	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
SEA BREAMS	27.47	266.29	70.8	34.48	7.162	5.89	1.5	0.148	0.1	0.49	0
CASSAVA FISH	255.03	425.76	524.48	234.43	182.18	138.6	295.09	225.03	206.9	273.46	317.03
BURRITO	0	632.08	679.38	354.76	196.32	274.08	446.61	326.741	169.05	245.09	264.98
TRIGGER FISH	0	2.23	3.02	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
RED MULLET	450.35	56.89	40.21	4.98	0.18	0.04	0	0	n.a.	n.a.	n.a.
FLYING GURNARD	0.12	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
CUTTLEFISH	63.15			72.23	20.34	19.79	29.22	1.124	0.35	8.411	1.852
OTHERS	655.42	3828.39	1492.36	726	437.51	434.58	722.54	667.88	519.08	682.99	710
SUB-TOTAL	1451.54	2393.78	2810.25	1426.85	843.69	872.985	1494.96	1220.923	895.48	1204.402	1293.86
TOTAL INSHORE	**8668.06**	**7605.54**	**7784.55**	**13318.69**	**6331.35**	**7591.282**	**9877.17**	**10008.687**	**6140.25**	**12047.742**	**9823.305**

Source: Fisheries Commission of Ghana (2011)

Fishing Communities and Work Support Systems

Family sizes are large in the fishing communities, ranging from 6-20 per household (Dovlo et al. 2016). This is largely determined by the high demands for labour force for the key stages of pre-and post-harvest activities. A typical fishing unit comprises a canoe owner and his immediate family members. This core family is in turn supported by external relations such as nieces, nephews and cousins, who may constitute the crew members of a canoe, or help in fish processing (Dovlo, et al. 2016). Such an arrangement has provided the needed workforce and employment in the artisanal fishery industry over the years. Children are also involved in all such activities and by that, learn on the job and gain experience and knowledge in fishing or fish processing. Women contribute greatly to practices such as the collection and sale of landed fish in these communities. Most women depend on individuals, financial and non-financial institutions with high-interest rates for their fish processing business (Dovlo et al. 2016). Fishermen are engaged in other income-generating activities such as farming, trading, masonry, carpentry, driving and basket weaving (National Canoe Framework Survey, 2016).

Fishing is extremely gender-segregated profession in Ghana (Odotei, 2003). While women are involved in post-harvest fish handling operations, fishermen capture fresh fish. If the fresh fish is landed at the beach, women take up the responsibility for preparation and selling. The role of women is critical as they add value to fresh fish, through various processes that start their preservation. Women are also universal in the distribution of fish, both fresh and processed.

Therefore, women are the principal source of family income in Ghana's coastal fishing communities (Britwum, 1993; Odotei, 2002).

Statement of the Problem

Global value chains have been very useful in investigating firms, organisations and entrepreneurial activities. In Ghana, value chains have been used in evaluating the dynamics in the small-scale fisheries sector (De Silva, 2013; Nunoo et al. 2015), the fisheries sector (Asiedu et al. 2014), and the tuna industry, (O'Neill et al. 2018).

In order to determine how the operations are carried out from pre-harvesting to post-harvesting periods, the croaker fishery (sciaenids) value chain is assessed while analysing crucial issues along the chain. Much work has been done in Ghana and West Africa on the biology and ecology of the sciaenids. Aggrey-Fynn and Sackey, (2012) worked on Species Diversity and Relative Abundance of Fisheries Resources along the Central Coast of Ghana in the Coastal waters from Winneba to Cape Coast in the Central Region for 18 months using random sampling from beach seine landings. Frequency of counts was used and there was an identification to family levels. A total of 56 species were identified of which *P. senegalensis* was one. This was tagged as one of the economically important fish occurring in the Ghanaian waters.

For 18 months, Nunoo et al. (2013) investigated the food habits in the nearshore waters of Benin for *Pseudotolithus senegalensis* and *Pseudotolithus typus* using frequency of occurrence, numerical abundance, and gravimetric structure to measure the percentage index of relative value of each food item and

concluded that they were specialist feeders. This was done due to the commercial importance of the species.

Blay et al. (2006) investigated "Seasonal Variation in Food Preference and Feeding Ecology of Two Juvenile Marine Fishes, *Pseudotolithus senegalensis (Sciaenidae)* and *Brachydeuterus auritus (Haemulidae)* off Cape Coast, Ghana" and reported that the croakers ingested prey up to 77% of its total length. The stomach content study was based on the frequency of occurrence, and the numerical and gravimetric composition of these food products revealed that shrimps were the main food of *P. senegalensis* and represented the primary food of croakers during the year and the findings were compared with croakers from other areas of the Gulf of Guinea. A total of 435 *P. senegalensis* stomachs were examined.

Tientcheu, and Djama (1994), also worked on the "Food habits of two sciaenid fish species *Pseudotolithus typus* and *Pseudotolithus senegalensis* off Cameroon Coast in West Africa and reported that, in Ghana and West Africa, they constitute an abundant and commercially valuable fish. Other publications have stated that the species are economically valuable across the Atlantic coast of West Africa (Bayagbona 1963, Gbaguidi, 2000, 2001; Sossoukpe, 2011; Sossoukpe et al. 2013).

Although the species is stated to be economically important in Ghana and West Africa, no information is available on the value chain of the species in the Ghanaian fishery. Further, estimates of the biomass of surveys of the demersal species in Ghana show that the potential yield of the total demersal biomass on Ghana's continental shelf have landings which exceeds the estimated potential

yield, and this demonstrates a stress under which the fishery has been operating (Quaatey, 1997; FAO, 2007). Currently, the croakers are one of the most harvested demersal species in the Ghanaian waters (Antwi-Asare & Abbey, 2011). It is against this backdrop in the literature that a study into the current economic contribution of the croakers is being sought. The research also helps to find out if the croakers are possibly being stressed.

Objectives of the Study

The primary aim of this research was to assess the croaker value chain, taking into consideration the production, processing, trading and consumption of the fish product to determine how much value is added at each stage of the chain. Furthermore, draw comparative analysis between the cost and profit margins for the croaker fishermen, fish processors, the fish retailers, wholesalers/middlemen. Specifically, the objectives of the research are to:

a. estimate the economic value of croakers at the landing sites and value due to processing.
b. establish the value chain market map and assess profitability of the croaker fishery along the value chain.
c. identify factors that influence pricing, equity; and consumers' willingness to purchase the croaker fish.
d. assess the level of economic reliance on croakers by fishermen.
e. examine the constraints and opportunities in the croaker fishery.

Significance of the Study

Value chain analysis improves the earning opportunities and working conditions of local people and enhances the ability of local enterprises to compete in the global economy (FAO, 2014). Findings from VCA helps to come up with good economic policies appropriate to the level of development in industries and how local enterprises fit into the global economy. It helps the policy maker to find out where the bottlenecks are, the part of the chain which holds up progress, the bottlenecks that deserve priority attention of government, private sector or public-private partnership, and also the various stakeholders and donor agencies who can help resolve prevailing issues in the organisation (Kaplinsky and Morris, 2002). Recommendations from VCA serve as bigger picture and an important guide for policy-makers to make decisions.

Estimating the economic value of the croakers at the landing sites helps in determining the worth of the croakers at each study site along the chain, considering the network of cost-benefit of the fisheries including pre-production operations, production, and sales of the products. The value attributable to processing helps to identify how much wealth has been added during the transformation stages of the product from the fishermen to the other actors.

Assessing the profitability of croaker fishing on the value chain helps to recognise the key players who are dominant on the chain. This is to show the actor or entrepreneur, who made the most profit or who had most control on the chain. It also helps to define the possibilities and limitations arising from the chain. Profitability helps to understand the gains made along the chain. Evaluating profitability in this study also helps to understand how evenly or unevenly the gains have been distributed across the chain and who would need support along

the chain (Kaplinsky and Morris, 2000). The identified gaps would lead to assessing factors for improving profitability to ensure equity at all levels of the chain.

Many fishermen in developing countries sell their fish as soon as it is landed, and what their price decisions are focused on is not too clear. Analyzing factors that influence pricing and equity within the croaker fishery gives a fair idea of what fishermen consider before the sale of their products.

Assessing the level of economic reliance on croakers by fishermen helps to identify the economic contribution of the species in the livelihoods of the fishermen. It also reveals whether the croakers are overfished among the demersal species and are considered stressed.

Examining the constraints and opportunities in the croaker fishery helps to address the specific challenges which impede the actors' work along the chain and to make recommendations for redress. This can create opportunities for stakeholders and interested groups to support the croaker fishery industry. VCA helps to strengthen domestic linkages and domestic support systems which play a critical role in creating international competitiveness. Being competitive internationally requires an effective investigation along the domestic value chain (Robben, 2018). Good economic strategies relevant to the croaker fishery's growth and how the sector could fit into the global economy, could be arrived at.

The study helps to identify the current position of the croakers among other demersal species in terms of income generation and ascertain the exploitation levels. This will help policymakers to figure out where the bottlenecks are on the chain, and that which merits government's priority, private

sector or public-private partnership, and also the various stakeholders and donor agencies who can help resolve prevailing issues in the organisation. The study into the value chain analysis offers a good picture of the different sequences of actors' actions and the main relationships involved in the croaker value chain.

Sustainable Development Goal 14 (SDG 14) talks about "Life below water" and it is one of the 17 Sustainable Development Goals established by the United Nations in 2015. The official wording is to "Conserve and sustainably use the oceans, seas and marine resources for sustainable development" (United Nations, 2017). The Goal has ten targets to be achieved by 2030. Among the targets are to effectively regulate harvesting and end overfishing, implement science-based management plans in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield and sustainable management of fisheries. It also provides access for small-scale artisanal fishers to marine resources, markets, and to increase the economic benefits from sustainable use of marine resources as well as protecting and restoring ecosystems (Sturesson et al. 2018).

The current research aligns with these goals since the fisheries sector creates jobs and provides employment for many along the value chain, serves as food security thereby reducing hunger, and provides the needed protein in the country.

Delimitation of the Study

This study focused on only croakers taking into consideration the production, processing, trading and consumption of the fish product to determine at each step of the chain, the economic value. Furthermore, it is also limited to the Central and Western Regions of Ghana. Respondents within the value chains included croaker fishermen, fish processors, the fish retailers, wholesalers/ middlemen.

Limitation of the Study

This research was conducted in the Central and Western Regions of Ghana, and limited to these regions and not the four major fishing Regions due to time constraints. The major limitations were the fact that most of the respondents do not keep records on expenditure etc. which meant being close to them to understudy their routine practices before picking up the needed information from them and also the fear of being taxed by giving the right information.

Organization of the Study

The research was organised into six Chapters. The introduction consists of the background, problem statement, goals and justification which formed Chapter One. Chapter Two provides the literature review which critically examined both the theoretical and literature approaches to the subject of value chain design and analysis, profitability, pricing and various institutions supporting the croaker fisheries sector. In Chapter Three, the research methodology highlights various methods employed in conducting the research. Chapter Four presents the results of the objectives of the research. Chapter Five presents the discussions of the

objectives of this research work, and Chapter Six provides the summary and conclusions of the study and suggest some policy recommendations.

CHAPTER TWO

LITERATURE REVIEW

This Chapter reviews relevant literature which are useful in value chain analysis. It covers concepts of value chain analysis and supply chain, value chain approaches, profitability, the global value chain governance structures, factors affecting fish marketing, institutional support affecting the croaker fishery and the conceptual framework of the study.

The Value Chain

Value chain is the entire set of activities required across the different stages of development, transformation and distribution to get a product or service from conception to final consumers (Kaplinsky and Morris, 2002). It defines how chain operations are performed and how value is generated and shared among the participants in the chain. The value chain of fisheries in Ghana is essential for food security, job creation and the ideal management of fisheries.

Concepts in Value Chain Analysis

Analysis of the value chain is the process of identifying actors and their roles to help understand their functions. It shows a linkage between the enabling environment, relationships between the actors, the chain governance, institutions involved, and facilitates the chain formation and strengthening (UNIDO, 2009). It further defines the tasks of value addition in the chain and assigns to each of those activities costs and added value (UNIDO, 2009).

Analysis of the value chain helps to explain the features of the players in the chain and the interactions between them and the movement of goods across the chain, the characteristics of the work and the final destination. Torres, Paiva, Ferreira & Rocha (2013) wrote that the study of the value chain leads to finding opportunities for change in order to create greater productivity for public agencies, thus creating an alignment between the policy of the company and its operations. In bridging the gap between the emphasis of conventional economics on aggregate, poverty measures such as income levels and the stress of livelihood perspectives on micro-level uncertainty, evaluating value chains is critical (Kanji and Barrientos 2002). Essentially, it is critical to establish a good supply chain to build a value chain, as adding value will never be feasible without a supply of goods (FAO, 2014).

Concept of Supply Chain

The supply chain is the set of interactions between vendors, producers, dealers and retailers that enable conversion of raw materials into finished goods (Beamon, 1998). Again, a supply chain is a network of dealers, distributors, transporters, storage facilities and retailers participating in the production,

distribution and sale of commodities to the consumers (Harland, 1996). Although the chain contains numerous business features, it is regarded as a single organisation. The analysis of quantitative models that describe the different economic trade-offs in a product's supply may also be described (Simchi-Levi et al. 2004). The primary goal of supply chain management is to optimise profits by reducing the number of ties in the chain and holding to minimum challenges such as, costs incurred and time to market (FAO, 2014), which is similar in the study of the value chain.

According to Hart (2018), there are five primary activities which include all the actions that go into the creation of a value chain business. These activities include inbound logistics, manufacturing/operations, outbound logistics, marketing and sales, and services. In this study, both value and supply chains are employed to arrive at the value addition and profitability analysis of the chain.

The Concept of Value Addition

The accumulation of wealth and the contribution of the manufacturing process to economic development are calculated by value addition (FAO, 2014; Porter, 1985). The contribution of value is the distinction between the gross value of output (including all expenditure made related to production) and the wealth consumed in the process of production (Bockel and Tallec, 2005). Value added is the value that each agent, contributes to the valuation of inputs during the accounting time of the production phase along the chain.

Value addition applies primarily to how local firms produce more value within the local economy, thereby generating more employment and higher wages

(Nutz & Sievers, 2015). An analysis of the value chain could also seek to find out more about where much value is generated in the value chain. Porter (1985) has clarified that the value chain of a business is influenced by the supply chains of its suppliers and customers, because they are all elements of a value structure. The concept of value addition in value chain has been used to improve the sustainable competitive advantage of an industry in the business sector (Porter, 2008). Porter (2008) contends that there are four support activities directly involved in creating the final value addition. These are (i). the company's infrastructure (ii) human resources (iii) technological development and (iv) procurement.

The value chain framework aims at maximizing value creation while minimizing costs. According to Muluken (2014), washing, drying, grading, bulking and storage are the simplest value adding methods; these operations are carried out by the production team and by actors or service suppliers at the shore. The supply chain can be relatively straightforward in situations where producers of raw materials, middlemen, processors/packaging centres, wholesalers and distributors work together (GTZ, 2007). The value added per unit of an output is the difference in price that the actor pays for input received at the previous stage on the chain (Kuwornu et al. 2013). The preparatory work on fish requires time and as a result, busy mothers and housewives are hesitant to purchase unprocessed fish. Convenience plays an important part in the commercialisation of fish and fisheries (De Silva, 2011). There is also a high demand for fish species that are clean, cut and ready to cook or ready to eat, and customers are prepared to pay additional premiums, which helps to maximize profit.

Value Chain Mapping

Value chain mapping illustrates how a commodity passes from raw material to manufacturing, processing, and other phases in an industry, before it ultimately ends up with the final consumer (Austin, 1992). Using value chain analysis, which may involve qualitative and/or quantitative instruments, value chains can be mapped and evaluated (Hellin and Meijer, 2006). The value chain design is based on the company's operations and may be defined by a continuous left-to-right flow of processes that help consumers generate value (Austin 1992; Pavani & Scucuglia, 2011). The structure of the chain helps to understand the interaction between the processes and the boundary units. Austin (1992), refers to horizontal linkages in value chains indicating direct actors and this is applied in mapping the core production linkages.

The business landscape of the value chain can be illustrated further by a market map. A market map is a conceptual and realistic instrument, which aids in recognising policy problems that could impede or facilitate the functioning of the value chain, and organisations that offer the resources required to make better-informed decisions by the various chain actors (Hellin and Meijer 2006). According to Barnes (2004), value chain is an association of firms partnering vertically to gain a more rewarding market position. Market-focused partnership is a fundamental feature of a value chain. Robben (2018) describes the model of the value chain as a set of activities intended to create and develop a competitive product or service in a market based on a sustainable economic approach. The model assists the organisation involved to evaluate all their operations successively in order to maximise each move as much as possible in order to

create and leverage competitive advantage. By using the value chain, any association or entity that generates value and wants to boost its productivity will accomplish the objectives (Porter, 1980). The model allows the entities concerned to successively analyze all of their activities in order to improve each step as much as possible to form and optimize a competitive advantage. Value chain is a valuable tool in strategic management as it works on the positioning of a product or service on the market.

Approaches to Value Chain Studies

Different articles have argued about the different approaches used in analyzing value chain works. Porter (1985) originally introduced the idea of the Value Chain as a significant means of generating more consumer value and achieving comparative advantage. Value chain gives a comprehensive approach to the assessment of chain-long operations and the design of steps to enhance productivity and competition in order to achieve greater value for consumers. Value chain is a description of the activities carried out to develop, manufacture, commercialize, distribute and maintain a product (Porter, 1989). These are specifically the tactics of the organisation that help define the expense actions, cost factors, and competitive opportunities. The value chain leads to finding areas for change in addition to making public organizations more successful.

The value chain policy of Porter (1985) also reflects on the corporate value chain with principles that develop into the global value chain and players from various value chain players. This is generically broad and complete, but

because the model is very adaptable to each organization's particular requirements, it is not absolute. Value chain analysis is a methodology for accounting and presenting the value generated in a good or service as it is converted from raw inputs to a finished product to be used by customers (FIAS, 2007). Value chain analysis constitute identifying a market section to evaluate the flow of goods and services, mapping the framework of the value chain, quantifying and establishing the benchmark performance and analyzing gaps related to performance (FIAS, 2007). In a related finding, Kaplinsky and Morris (2000) describe the chain analysis as how the entry point of the chain is done, how chain is mapped, how the market segments are evaluated, determining the efficiency of production, the power relations of value chains and the chain upgrade. Technically, these two ideas may be similar in many ways yet there are differences between them. FIAS (2007) notes the choice of the sector to assess when undertaking the starting point of value chain analysis and this is similar to what Kaplinsky and Morris (2000) refer to as identifying the starting point, though FIAS (2007) enquiry was more detailed. FIAS (2007) method also makes a suggestion for a market analysis in value chain which Kaplinsky and Morris (2000) puts as identification of product category and market assessment for producers.

Analysis of value chain describes how the actions of the chain are conducted and explains how value is generated and exchanged by participants in the chain. The method of value chain analysis by Kaplinsky and Morris (2001) emphasises on the complexities of interrelationships within the productive field

and goes deeper than conventional economic and social analysis forms. Other meanings, by contrast, exist.

The Global Commodity Chains (GCC) definition was introduced by Gereffi (2004) and this contribution has allowed substantial advances in the theoretical and normative use of the concept of the value chain, especially because of its emphasis on power relations. This reflects on not only the coordination of production processes that are geographically distributed but also link production systems. Importantly, this approach has demonstrated that a majority party (or sometimes parties) that determines the overall character of the chain differentiates multiple chains and are responsible for updating operations within individual links and managing relations between the links as lead company(ies) (Kaplinsky and Morris, 2000, 2002). It is possible to differentiate between two types of chains; chains where buyers organise (buyer-driven) and those of which (producer-driven) distributors play a vital role. The degree of explicit teamwork and force asymmetry (Gereffi, 2004) classifies this accordingly. A main theoretical approach to the definition of the value chain is the governance concept.

Hobbs, Cooney and Fulton, (2000) define the value chain as a form of the supply chain referring to the entire vertical chain of activities from production through to consumption; regardless of how activities are organized or functions. Thus, Hobbs et al. (2000) had a similar definition to the definition of Kaplinsky and Morris (2000), but emphasised the permanence of linkages between chain actors rather than the creation and sharing of value.

Bezabih (2008) researched on the value chain in the Eastern parts of Ethiopia and found out the chain's main marketing constraints. These were greater number of intermediaries involved in the marketing, lack of institutions that safeguard the interest of farmers, low commodity prices, no standardized pricing methods, lack of coordination between producers to increase their bargaining power, lack of transitional goods and lack of coordination to enhance bargaining power of producers. Thus, value chain helps to identify gaps along the economic chain.

Can, Gunluu and Can (2015), conducted a study on fish consumption preferences and factors influencing it at Antakya, Turkey. Scatter diagrams were used to investigate the potential association between variables. The relationship between the socioeconomic characteristics of consumers and the degree and frequency of fish consumption was evaluated using correlation coefficients. To analyse the effect of determinants on fish consumption, multiple linear regression (MLR) was used. The study reported major differences between age groups, demographic groups, educational groups and marital status in the consumption of fish.

Almaz et al. (2014) used the value chain approach to gender-based analysis on restrictions in Ethiopia. The study's result revealed that major issues complicated the value chain, including: lack of manufacturing and marketing expertise, lack of resources, lack of business knowledge, middlemen hindering the fair pricing, unable to provide good marketing strategies, rural road access problems, storage problems, and lack of demand. The report suggested giving due consideration to marketing and manufacturing.

Based on the thorough definition of the role of the chain actors and the business climate, a combination of Kaplinsky and Morris (2000, 2002) and FIAS (2007) is used to determine the value chain linkages in this study.

The method from Gereffi (2004) and Schipmann (2006) is used in analyzing the governance structure of the chain at all the stages whiles CRFM (2014) offers aid in the formulation of the upgrading strategies.

Fish Supply in Ghana

In all regions of the world and in Ghana, fish is regarded as the most essential source of protein from animals (Anon, 2003). For domestic use, fish is sometimes purchased fresh, smoked, dried, salted and canned, frozen, fried or grilled (ATFALCO, 2012). Fish traders (also known as fish mothers or 'konkofo') in Ghana pre-finance their fishing trips and purchase fish from fishermen for sale to other players in the fish supply chain, most of whom are smoked fish processors (Ghana Marine Canoe Frame Survey Study, 2016). Fish is also offered directly to fresh fish retailers, producers of salted fish ('momone'), and private consumers. The Queen Mother (often named konkohema) negotiates a deal for the first boat that arrives at smaller landing sites and this price is usually true for the remainder of the day. This position has allegedly lost its significance at larger landing sites such as Sekondi harbour, and on a boat-by-boat basis, rates are agreed. The konkohema is nominated by the mothers of the fish trade, and stays in force forever or unless advised to stand down by her elders and fish mothers (Boateng et al. 2020). The konkohema gives the fishermen the final pricing verdict of the day and this must be adhered to. Exchanges are usually carried out

between fish mothers and processors or consumers at the landing place where they buy the fish. Konkohema works as an intermediary at different fishing sites and also plays an important role in informal financial assistance.

Factors Affecting the Market Value of Fish

Directing production towards external markets has accounted for both positive and negative effects in communities. There are advantages for traders, on the one hand, primarily in the form of increased sales and, on the other hand, demand continues to intensify the exploitation of resources to the point of scarcity of resources and could contribute to ecosystem destruction (La Vina, 2002). Jacinto (2004) suggests that the present 'underpricing' of fishery goods in both domestic and international markets is a geopolitical issue that needs significant consideration. Final market costs, whether domestic or foreign, do not represent the true cost of producing fishery products as long as there are externalities in the value chain. What is costly and unsustainable becomes inexpensive with the social and environmental effects missing from the equation (Jacinto, 2004).

According to Namisi (2005), environmental improvements, fish condition, water contamination, location and customer price demand have been described as the key factors which are considered to affect the market price demand for fish. Awareness of these factors will impact the market value of fish, and could help both producers and buyers establish and improve strategies for the purchasing and sale of fish. The fish trade is a global infrastructure that connects markets with fishing communities (Alapan, Arpilleda, Altizo, Frias, Gerlyn, & Ravelo, 2016). In a dynamic economy, according to Peterson (2007), the unit price of a particular

commodity or other commercial object, such as labour or liquid financial assets, varies until it reaches a point where the quantity requested (at the current price) is equal to the quantity produced (at the current price), which results in an economic balance between the price and the quantity transacted.

Yamashita (1996) also argued that the market price of fish is influenced by many varying factors. They include freshness and efficiency, domestic price differentials, monopsony, storable and non-storable goods, statistical adequacy, and differentials in production-retail costs. Therefore, the consumer price is formulated depending on multiple considerations. Purchaser requirements are very important for the selling of fresh goods, according to De Silva (2011). There are two main buyers: individual buyers and institutional buyers, but the amount of trade varies based on the type of buyer. The level of trade is influenced mainly by seasonality, economic condition, cultural aspects and buying power of consumers (De Silva, 2011).

Buying and selling are normally done from the boats and canoe as soon as fish is landed directly to traders and consumers. This does not give a clear indication of how the market pricing for fish is carried out (De Silva, 2011). However, in most situations, pricing is done by negotiation. In this way, fish sales and purchase guides and regulatory policies are affected, leading to weak economic competitiveness (USAID, 2013). Value chain pricing need to be correctly calculated from the initial stages and knowledge should be gathered from different sources, such as frequently available government records, market organisations that are required to provide prompt and reliable information on which their business decisions are focused, and academic and research institutions

(Jacinto, 2004) . According to De Silva (2011), in order to provide and retain a loyal community of customers, year-round availability and frequent deliveries of fish are important. Products which are not available all year round experience price differentials which may cause price increase during lean periods. Seasonality is common with many fish species and this may drive consumers to search for substitutes.

Mayers and Vermeulen (2002) suggest that structures such as community-company groups and rural associations deal directly with firms that are open to economic cooperation for the sale of their produce. In order to prevent abnormal price spikes, for instance, fish purchase companies could purchase directly from fishing groups rather than depending on fish traders. Distributional effects are often skewed to the advantage of traders, processors and other intermediaries, leading to producers becoming disadvantaged (Jacinto, 2004).

Post-harvest Handling of Fish

More than 33,000-woman fish processors in Ghana employ conventional methods to store and prepare fish for consumption and storage, according to Owusu, Opare Addo, & Kent, (2019). The study further reveals that there are health issues involved with the conventional smoking approach among both processors and consumers. Risk factors for cancers (in adults) or upper respiratory diseases (for children) may be such diseases (Owusu et. al. 2019). Some of the advantages of smoking fish include improved fish taste, decreased waste, and longer fish shelf-life (Gordon, Pulis, & Owusu-Adjei, 2011). In developing

country economies, post-harvest losses are said to be as high as 30 percent to 40 percent of harvest (De Silva, 2011).

Processors often buy fish from fish traders, according to Boateng et al. (2020), although there are instances where they buy fish directly from fishermen. If the stock of fish is insufficient, processors go to other landing sites to buy fish. Processing of fish, which represents an important sector for women, seems to be concentrated at the small and medium-scale levels (Dovlo et. al., 2016; Kegan, 2001). Smokers use Chorkor ovens and use different equipment in their line of operations, such as baskets, basins, grills, nets, fuelwood and brown papers. In some cases, women who act as itinerant traders go to processors in their communities to buy the fish, which they sell to retailers in urban markets. Smoked fish is sold to consumers (individuals and food vendors) by traders in the same market (urban markets or smaller neighbouring markets), while others are exported to retail villages. Most of these suppliers trade in smoked sardinella and a few other species of smoked species (Dovlo et al. 2016). Packaging is a form of value addition and one of the ways in which goods are attracted to customers. Healthy packaging materials can maximise the goods' handling and increased shelf life. Food habits and food culture have direct impacts on the consumer preferences (De Silva, 2011).

On transport, Nunoo et al. (2015) worked on some fish species in Ghana and reported that value chain transport over longer distances is carried out on roads using cold vans, taxis or other passenger vehicles, while transport within the market is mainly by head porters, small trucks and tricycles.

Technological Innovations in Stoves/Ovens usage over the years

The leading fish processing technique in Ghana is fish smoking and about 70-80 percent of local fish consumption prefers smoked fish. (Asiedu, Failler, Beyens, 2018). Different stoves have evolved and have been used over the years in relation to human health (SFMP, 2015), to reduce fuel consumption and improve the quality of smoked fish (Beran, 2018). Currently, the Chorkor and Morrison stoves are used by most processors. The Ahotor ovens have however been recommended for processors due to its environmentally hygienic and low PAH levels. According to Asiedu et al. (2018), high levels of polycyclic aromatic hydrocarbons (PAHs) have also been found in smoked fish products and so it is vital to examine trends in the smoked fisheries sector of Ghana in order to ensure food safety, nutritional needs and fish food conservation.

Food Safety and Quality Standards

Food protection and quality standards is an important issue in fish supply chains. According to FAO (2004), there is an increasing impact on fisheries to conform to frameworks to ensure food safety and consistency such as Hazard Analysis and Critical Control Points (HACCP) initiatives. This underscores the need to improve postharvest infrastructure that will minimise perishability of fishery products such as the establishment of cold chains which, if available to small-scale fishers, will further increase their market leverage (FAO, 2004).

According to the findings of Alejandra et al. (1992), consumers consider quality the most important factor in making the choice between varieties of alternatives, although for others cost and parameters such as convenience are

vital. Compared to developed nations, health, food safety and sanitation are the main issues of developing countries. (Barro and Lee, 2010).

Fish Trade Channels

Sea fish from the coast are sent in different forms to other regions of Ghana. Accra, Ghana's capital is the most important domestic market and consumption hub. Other important centers as contends by Boateng et al. (2020) are Asafo and central markets in Kumasi, Sunyani market, Agona Nkwanta, Takoradi and Sekondi markets. Fish is sold fresh and whole to the market. If it was to be moved from one place to the other, ice was available and placed on it. Fish from Ghanaian waters are sold both locally (in-country) and across the borders mostly to the West African countries such as Togo, Nigeria, Benin, Cote d'Ivoire and Burkina Faso. It is unusual for processors to move around the nation to market their fish, but most retailers do all the travel (ATFALCO, 2012).

There is also a need to consider distributional impacts in the area of fresh fish trading to ensure that disadvantaged fishermen are genuinely reaping the economic benefits of their trade (Macfadyen, Banks, Phillips & Haylor, 2003). In the lean season, fish is primarily bought and sold from local producers for use in smoked form and from frozen imports (De Silva, 2011). Species such as sea breams snapper; shrimp; lobster; grouper; cuttlefish and other species of demersal fish are sold to and consumed by the wealthiest (De Silva, 2011).

Profitability in Value Chains

In this study, profitability analysis is used as the main tool to assess the profit margins among the value chain actors. The basic economic theory notes

that corporations are organisations that optimise profit. Keynes (2013) contends that profit is the driving force behind the development of business entities and that each business entity should gain adequate profits to support and expand over the long term. Benefit is the surplus sales for a given time over the corresponding cost of production. On the other hand, profitability is an investment potential to gain returns on its use (Tulsian, 2014). Analysis of profitability sheds more light on company organizations' financial success and productivity (Tulsian, 2014). Net revenue pronouncements referring to other estimates, such as sales, cost of products sold, administrative costs and capital spent, are beneficial.

Study of profitability is considered one of the best strategies for calculating the effectiveness of the resources employed as well as the operating performance of a business. This research uses profitability methods such as gross income, net profits and return on investment (ROI) to classify the winners and losers (i.e. who benefit the most in the chain) and net present value (NPV) to determine the profitability of actors in selected locations. Net present value is a capital budgeting method for evaluating a project or investment's viability. It is determined by taking the gap over a span of time about the amount of cash inflows at current and the value of cash outflows at present (Kenton & Mansa, 2020). The net present value, by discounting the flows at a given rate, is the net of the present value of cash inflows and outflows. There is the need to discount them at a specific rate to derive the current value of the cash flows. This rate is calculated from the yield on the assets of an investment with a comparable risk or borrowing cost.

NPV takes into account the amount of capital in terms of time. Based on the current valuation of the cash flows, NPV helps determine if it is worth taking up a project. A positive NPV means a project is worth pursuing whiles a negative NPV is dismissed. If the NPV is zero, the organisation will remain oblivious. Profitability analysis helps to determine the governance structure along the chain. Marketing margin costs assist in the measurement of spendings which are the costs incurred in carrying out separate marketing operations and the transportation of products from producers to consumers.

Trade increases jobs and revenue production, both directly and by multiplier effects, but the distributional impacts of trade must also be taken into account to ensure that disadvantaged suppliers obtain due profit from the economic gains of the trade (Macfadyen et al. 2003). Profitability analysis shows the performance along the value chain and can determine the influence, power and noticeable control over the other actors, depicting the dominant actor governing the chain (Gereffi, 2004).

According to Gereffi and FernandezStark (2011), the knowledge of governance helps to understand value chain controlled and coordination, as to which actors gain more power than others in the chain. An analysis into value chain governance provides opportunities for policy recommendations and policy formulation (Babu & Verma, 2010). Lack of governance along the value chain according to Irawati et al. (2009) ends up in challenges of unevenness, in terms of distribution of gains among actors. It also results in an unfair value added distribution as well as uncover issues of chain coordination or governance on the value chain. Liang et al. (2010) wrote that producers often take so much risk, but

normally do not receive the right share of the profits as a result of their weak bargaining power.

According to UNIDO (2009), governance is a crucial element in determining how goals for change will be accomplished and so issues of inconsistencies on the chain relating to coordination or governance are uncovered when there is a value chain analysis. Profitability helps analyse the advantages of chain members and others who require assistance to maximize efficiency and gains. In the prevalent sense of market liberalization, this step is necessary because the most vulnerable on the chain are often the poor.

Types of Governance in Global Value Chains

Five basic types of value chain governance systems have been analytically identified (Humphrey & Schmitz, 2002; Gereffi, 2005; Ponte, 2008; Sturgeon, Van Biesebroeck, & Gereffi, 2008). They are:

Market

Market governance includes knowledge on products characteristics which is readily conveyed in reasonably easy transactions, and manufacturers can make products with minimal buyer input. These arms-length transactions require little or no formal cooperation between participants, and for both producers and buyers, the cost of switching to new partners is low. In this case the buyer has no control over production interest, sets few, if any, standards, and provides producers with little or no information about what the market wants and how to produce it. Here at this point in the chain, the parameters are defined solely by each company, and the central governance mechanism is price rather than a powerful lead company.

An example is when at the farm gate or in a wholesale market, a trader buys produce and either sells it on the local market or exports it.

Modular

This is the most market-like of the patterns of chain network governance. Suppliers in modular value chains typically make products or provide services to the specifications of a customer. Suppliers tend to take full responsibility for process technology in modular value chains and often use generic machinery that spreads investment across a broad customer base. This keeps switching costs low and limits transaction-specific investments, even though it can be very complex for buyer-supplier interactions. There is a high volume of data flowing through the inter-company connection.

Relational

Interactions between buyers and sellers are defined in this network-style governance pattern by the spread of information and embedded services based on shared reliance, governed by reputation, social and spatial proximity, family and ethnic relations, and the like. The lead firm also determines what it needs, despite reciprocal dependency, and manages the highest valued operation in the chain, thereby possessing the capacity to exercise more control over the provider. Because of their complexity, consistency, origin or other attractive features, suppliers in relational chains are more likely to deliver goods distinguished in the marketplace. Consequently, dense exchanges and sharing of information exist, but this knowledge cannot be codified, quickly communicated or understood, unlike

modular networks. In addition, it takes time to create relational linkages, so the costs and challenges involved in transitioning to new partners seem to be high.

Captive

Small vendors in these chains are dependent on a few customers who also exercise a great deal of influence and control. Often such networks are distinguished by a high degree of oversight and control by the lead organisation. Under conditions set by, and sometimes unique to the individual customer, the asymmetric power relationships in captive networks require suppliers to connect to their purchaser. This adds to dense interconnections and heavy switching costs all round. Such leading companies often invest in the distribution sections and process improvements.

Hierarchical

In a group of leading organisations that create and produce goods in-house, hierarchical governance is defined by vertical integration and managerial power. This typically happens because it is not feasible to codify design requirements, products are complicated, or extremely qualified vendors cannot be identified.

Governance Structure of a Value Chain

Value chain governance is described by Marshal and Schreckenberg (2006) as how power is exerted within actors in the value chain. Value chain accountability plays a significant role in how manufacturing capacities are

upgraded. It also defines the value chain's longevity and the allocation of profits among the players in the value chain. A central concept in the study of the value chain is governance. Governance is non-market co-ordination of economic output. According to Gereffi et al. (2001), governance mechanisms contribute to the decision-making process that has a direct effect on developed world businesses' access to foreign markets and the variety of operations they will conduct.

Governance within the definition of the value chain specifies the framework of relationships and communication mechanisms that exist among chain actors (Schipmann, 2006). The study distinguishes structural players by concentrating on governance that may need funding to enhance value chain capacities, increase value addition in the sector and correct distributional distortions. Governance is thus a crucial factor in determining how to accomplish the variables for enhancing (upgrading) equity at all stages of the chain.

The regulation of the value chain gives an understanding of how the chain is regulated and organised as certain players in the chain exert greater authority than others (Gereffi and FernandezStark, 2011). This awareness helps to define directions and options for practical intervention, advocacy, and policy formulation (Babu &Verma, 2010). GTZ (2007) and Coulibaly et al. (2010) identify three levels in value chain concepts, which are micro level, meso level and macro level. These are relevant and are embedded in a value chain analysis.

Chain Macro Level

The macro level refers to the public agencies and institutions which constitute the business-facilitating climate. Usually, the macro level of a value

chain consists of national, regional and local governments, policies and major suppliers of public services (particularly roads and supplies of water). The macro level describes the general environment for organisational reductions across multiple segments of the economy.

Chain Micro Level

The micro stage of a value chain comprises the operators of the value chain and the manufacturers of the operating service together.

Chain Meso Level

The meso level includes all chain-specific actors in a value chain to provide routine, help programmes or represent the VC actors' mutual interest. Meso-level positions include for instance, the implementation of infrastructure, cooperation on technical practises, event marketing, cooperative publicity or advocacy. Support service providers take care of them.

Fish Consumption Preference in Ghana

Multiple studies have concluded that the regional, socioeconomic, and cultural characteristics of consumers influence fish intake, frequency, and tastes (Burger et al. 1999; Pieniak et al. 2011). Several sensory factors such as taste, scent, texture etc. and non-sensory factors such as behavior, attitudes, personal qualities, understanding of danger, etc. also influence the expectations (Honkanen et al. 2005). Fish may either be eaten fresh or frozen. Fish has traditionally been eaten processed in Ghana, while fresh fish is often eaten raw in Turkey (FAO, 2013). According to Can et al. (2015), growing and sustaining the amount of fish

consumption would contribute to an increase in productivity and have a positive impact on jobs and exports.

Gender Roles in Fisheries Value Chain

Sex refers to the attributes, norms, philosophies, stereotypes and qualities collectively created that a given culture ascribes to women and men's attitudes and acts (DFID, 2015; FAO, 2016c). In contrast with men, current gender differences position women in a lower socioeconomic status, which in turn has clear, negative effects for women in terms of their access to wealth, decision-making and opportunities (FAO, 2016c). Various facets of pre- and post-harvest fish handling and processing in Africa are correlated with gender stereotypes. From one geographical region to another, this distinction varies. Women dominate the on-shore handling and distribution of fish in West Africa, for example (SFMP, 2015).

Salting, fermentation, sun drying, frying and smoking are female occupations in Ghana. Some women still own fishing boats, but when they process or sell the catch, they lease them to men for fishing (Entee, 2015). In addition to influencing their lives, empowering women focuses on the entire family. Empowerment is about improving gender dynamics to increase the capacity of women to influence their lives with respect to women and value chains (Laven & Verhart, 2011). Therefore, variations between how women and men show interest in and benefit from value chains are not a concern from an equality standpoint, because differences in desires have to be separated from denials of choice.

Associations and Cooperatives

Associations and cooperatives are essential media in bringing people who work towards a common goal together and it is very important in value chain activities. Associations help to make decisions about jobs and to access other pressing needs. FAO (2004) notes that a vast number of small-scale fisheries already work alone at community level and are not associated with any organisation and that this weakens their socio-economic status and affects fisheries efficiency as an economic field. In addition, it makes them susceptible to dealing with other players, such as traders, processors and exporters. This condition is also exacerbated by the lack of clarity in the mechanism of pricing and asymmetric knowledge flows, the lack of resources to invest in advanced technologies and the lack of sufficient post-harvest facilities, in particular the lack of cold chains essential to fishery products (FAO 2004).

Ndyetabula, (2014) indicates that, networking role and relationships between direct actors are very important in value chains. The creation of alliances that enable participants to meet, socialize and exchange experiences also strengthens the chain's relationships. However, affiliation with the value chain could be less important if the chain has a powerful leader who directs it.

Cooperative partnerships grant members the right to a basis for a community-based management structure that, by putting cost and benefit decisions together, could successfully overcome problems posed by the working group and externalities (Ribot 1997). Furthermore, in terms of developing global business linkages and engaging with prospective external buyers, this will also lead to a stronger negotiating role. However, it should be recognised that the

geographical expansion of commerce expands the number of persons who join alliances and that, given the corresponding rise in transaction costs, can be more difficult to form and sustain (Costanza 1997). Also, lack of accountability (Ribot 1997) to the members could essentially affect the quality of the associations.

For access to new markets and technology, knowledge exchange, accelerating goods to markets, maximizing overall efficiency and minimizing costs, alliances or networks are important: a business that enters an alliance is then attempting to transcend its limits (Harrigan, 1986). Burch, & Maes (2017), stressed that if company owners, representatives and managers have the ability to meet regularly and discuss with their peers and network activities to have a lot of space for developing valuable contacts and sharing ideas and news relevant to the industry and other sectors, a relationship of confidence can be established.

The Value Chain Enabling Environment

The enabling environment creates a conducive atmosphere for value chain activities to operate. These include access to finance, coordination from institutions (governmental and non-governmental) sources and flow of information on the chain, etc.

Value Chain Financing

Value chain financing is a strategy for an organised, sustainable, interconnected economy (Shwedel, 2007). It is a funding strategy, which uses an understanding of development, value-added and marketing processes in order to assess the financial needs of the chain's performers, and how best to provide those concerned with funding (Miller & Jones, 2010). In order to satisfy particular

financial needs, many varied and creative financial instruments can be implemented or adapted.

To secure funding and minimise risk, commodities and cash-flow forecasts may be used (Miller & Jones, 2010). Value chain finance also creates an incentive to extend corporate funding, increase financing performance and repayments, and reinforce or integrate linkages between value chain members. An applicant appraisal could be conducted by looking at main areas generally referred to as the 5 C's in a loan appraisal. These are: (1) character; (2) capability; (3) capital; (4) collateral; and 5) circumstances. However, banks usually assign collateral the highest priority, while character and capability are the object of priority in microfinance. In loan appraisal, these remain relevant (Miller et al. 2010).

Marketing Information

Knowledge of marketing programmes are also focused on basic cell phones that help disadvantaged groups make better choices and find the best prices for capturing them (De Silva, 2011). The use of scalable local networks connects suppliers, retailers, NGOs, the public sector and customers to explore the flow of knowledge they need (De Silva, 2011). The relationships between a seller and a buyer depend on the relationships that each party has with the other and with third parties, that is, with other businesses. Exchanges are continuous mechanisms of exchange between a seller and a buyer where the parties are related to each other by creating a web/network of actors and relationships by interdependent relationships (Anderson & Mattsson, 2006). In developed

countries, most poverty reduction policies are predicated on improving productivity and encouraging market access and the incorporation of informal market trade for smallholder farmers (Nang'ole, Mithöfer and Franzel, 2011). According to Barrett (2008), this has demonstrated the potential advantages from a market-driven viewpoint at both philosophical and methodological stages. The losers of business ignorance are small-scale fishermen around the world, while the winners with large profit margins are intermediaries and traders (De Silva, 2011).

Institutional Support

Some Governmental institutions collaborate with, and work closely with the fisheries sector of Ghana to enhance the day-to-day operations to facilitate the improvement of the fisheries sector. All the institutions below work with fisheries along the value chain, thus with fishermen, fish processors, fish traders and fish consumers. A few of the institutions are highlighted below.

The Fisheries Commission (FC) and Ministry of Fisheries and Aquaculture Development (MOFAD)

The Fisheries Commission (FC), governs the administration, supervision and use of Ghana's fisheries resources (Beyens et al. 2017), is an internal ministry responsible for the planning of fisheries laws and policies, including enforcement by a semi-autonomous agency. FC plays a vital role in the production and management of Ghana's fisheries along the value chain. Through scientific research, MOFAD ensures the promotion of sustainable and thriving fisheries enterprises as well as provide extension and other support services to fishers (Dovlo, Amador, Nkrumah, et al. 2016).

Ghana Standards Authority (GSA)

The mandate of the GSA is to develop standards and to ensure that products and services meet with the standards and are of an appropriate quality for both local use and export. GSA is an internal body issuing export certificates to ensure that importers comply with the requisite hygiene, protection and health requirements for Ghanaian goods (Beyens et al. 2017). GSA's mandate to the fisheries sector is, therefore, to assist the fishers to meet acceptable standards, for both the local consumption of the fisheries products and to issue out certificates to the exporters of fish.

Export Development and Investment Fund (EDIF)

Founded in 2001, the mandate is to provide exporters with concessionary financing to cover export costs. It is an internal agency that functions through two major installations:

(a) The Export Development and Promotion Account (EDPA), which gives credit only to public and private sector agencies, organisations and trade unions, as well as to public and private sector bodies.

(b) The Credit Facility (CF) for the issuance of loans to producers and exporters at an interest rate of 15 per cent through the Designated Finance Institutions (DFI). The Government of Ghana (GoG) is in the process of updating the system in order to distribute credit more effectively.

Fisheries traders' associations can benefit from EDPA and CF for producers and exporters.

Ghana Export Promotion Council (GEPC)

The GEPC represents both internal and external roles and is required to assist exporters in finding goods of export value in cooperation with the ministries. Strategic business intelligence, sponsorship, equity engagement and procurement of inputs are supported by the institution. The Council also promotes international exchange and organizes trade fair participation, offers technical support, gathers statistics and engages in the development of legislation. Fishers therefore benefit (or are supposed to benefit) from the above services along the value chain.

Environmental Protection Agency (EPA)

The national environmental strategy is developed by the EPA and plans and tracks actions which may have an impact on the climate. The EPA is an internal body responsible for environmental matters and ensuring that through Environmental Impact Assessments (EIA), construction policies and projects take environmental factors into consideration. The EPA also maintains that predetermined environmental indicators are routinely tracked. The EPA enforces environmental regulations where appropriate. It disseminates public awareness about the world's status and implements non-formal education programmes. The agency has the personnel and capacity necessary to fulfil the tasks entrusted to it. Environmental hygiene is of great concern in the fishing sector and fishers along the chain are to benefit from EPA's services whiles EPA strengthens the environmental laws within the fisheries sector.

Ministry of Trade and Industry (MoTI)

It is the responsibility of the Ministry of Trade and Industry to lay down policies to help trade and industry develop competitively in domestic, regional and foreign markets, including economic development and job development for disadvantaged groups. It is an internal agency with much of its roles being external. It also serves Ghana as a big West African production hub with value-added products and finances. It is a commercial hub. For all operations, it has a logistics and value chain division that add value and competition to the product for the nation. Fish trade is an essential part of the key areas (Beyens et al. 2017). The fisheries sector, therefore, benefits from all the above services domestically and in international trade.

Food Research Institute

The Council for Scientific and Industrial Research's Food Research Institute (FRI) is an in-house institute that performs market-oriented applied research in the field of food science and technology and offers technical services and products for the food industry in Ghana. FRI is the largest post-harvest research and development agency in Ghana, which means that post-harvest handling issues in the fishing sector are handled by FRI.

The World Bank

The World Bank is an external organisation that assists (i) in improving the country's capacity to regulate and maintain fisheries in a sustainable manner; (ii) in reducing illicit fishing; (iii) in increasing the importance and viability of fishery capital and the proportion of the value of fisheries caught in the country; and (iv) in developing aquaculture. It also allows for expenditure that builds the

requisite policies and capacities for efficient fisheries management aimed at minimising fishing effort while retaining roughly the same amount of catch and resolving the impacts of transition on fishermen and the communities where they work.

Ghana Ports and Habours Authority

The Maritime Operations Department is the primary responsibility of the Ghana Ports and Harbors Authority for all vessels calling at the dock. It is an internal agency with a fishing port which serves as an attractive investment destination for fishing and fish products from companies around the world. Also, a fish market which sells fresh and frozen fish to the public; Cold storage facilities; Commercial banks; Warehouses which ships are stored; Shops which sell fishing gears and other parts, and a fish processing factory (PFC).

Customs Excise and Preventive Services (CEPS)

The Customs Division of the Ghana Revenue Authority (GRA) is a department authorized by the government to levy duties on all imports and exports. CEPS is an internal agency which promotes revenue security by preventing the smuggling of products across the borders of Ghana. Furthermore, they defend Ghana's borders by avoiding foreign violence and fostering Ghana's territorial integrity. The service is a member of the security services of Ghana. The service is supervised by import and export limits and prohibitions. Accordingly, the GRA controls all imports and exports of fish products in Ghana.

Bank of Ghana

The Bank of Ghana is mandated to develop Rural and Community Banks to support rural agriculture, fisheries and other rural activities. Within the communities, the fisheries value chain profits from these banks. The Bank of Ghana is also responsible for the creation of the Export Development and Investment Fund (EDAIF) to finance trade in Ghana, as well as for the development and promotion of agriculture in the agro-processing sectors. This is another area of gain for fish dealers in the value chain. The Bank of Ghana is prepared and committed to promoting selected value chains for agriculture and fisheries in order to maximize production, as well as fulfilling the Bank's growth goals of producing increased export inflows and among other items, curbing such imports in order to preserve foreign exchange.

Food and Drugs Authority (FDA)

The FDA is a government agency in Ghana responsible for the testing, registration and proper distribution in Ghana of food, goods and medicines. The Food and Drug Authority is an internal body responsible for public health protection by ensuring the safety, safety and effectiveness of human and veterinary medicines, biological products and medical devices, and by ensuring the safety of the food, cosmetics, and radiation-emitting products of our country. Therefore, the FDA is responsible for ensuring that fish is safe and free from all chemicals and contaminants before public consumption.

Ghana Revenue Authority

As an internal body, the Ghana Revenue Authority (GRA) is the Ghanaian government with the responsibility of evaluating, collecting and paying for tax revenue in Ghana. The Authority's central mandate is to ensure full conformity with applicable legislation in order to ensure a sustainable stream of government revenue as well as the regulated and safe movement of products through the boundaries of the country. The Ghana Revenue Authority (GRA) is the Ghana administration charged with the task of assessing, collecting and accounting for tax revenue in Ghana as an internal agency. The core mandate of the Authority is to ensure maximum compliance with relevant laws in order to ensure a sustainable revenue stream for government as well as the controlled and safe flow of goods across the county's borders.

The Authority is expected to assist taxpayers in identifying and meeting their tax responsibilities as part of attempts to strengthen enforcement by offering rigorous and detailed guidance. The three revenue institutions, the Customs, Excise and Preventive Service (CEPS), the Internal Revenue Service (IRS), the Value Added Tax Service (VATS) and the Management Board of Revenue Agencies (RAGB), have been merged into the GRA. GRA thus guarantees that in order to guarantee a reliable income stream, the fisheries industry complies with the full regulation.

Ghana Chamber of Commerce

The Ghana Chamber of Commerce strives to bridge trade between the continent of Africa and the global market. The sector promotes and extends

Africa's trade, commerce and education globally using Ghana as a gateway. It promotes multi-sector economic growth and opportunity on the African continent. The sector boosts fish trading activities across Africa and rest of the world.

Ghana Maritime Authority

The Ghana Maritime Authority is responsible for both Ghana's coastal and inland waterways and is an internal body. Its tasks include the expansion of the Port of Takoradi, which includes oil service facilities to support the oil and gas industry, the provision of appropriate regulations in response to the developing oil and gas industry, the construction of new container terminals for the Tema and Takoradi ports, the provision of new fish landing sites and harbours, the procurement of a training vessel for Regional Maritime University for training Seafarers, implementation of the Eastern Corridor Multi-modal project to boost facilities on Volta Lake and to include a strategic investor in the management of the PSC Tema Shipyard in collaboration with the Government of Ghana and more.

The Fisheries Board, the Ghanaian Navy, the Volta River Authority, the Environmental Protection Agency, the Ghanaian Ports and Harbours Authority, etc., are among its regulatory bodies. All of these facilities are in support of the Ghanaian fisheries sector.

Conceptual Framework of the Study

The following structure was used in this study and it explains the value chain relationships between the actors leading to the consumers and their enabling environment (Figure 2).

The chain consists of direct actors involved commercially in the chain (fishermen, fish processors, retailers, wholesalers, consumers) and indirect actors (financial institutions (banks and non-banks), government agencies, non-governmental organisations, research institutions, etc.) providing services to promote the functioning of the value chain. The framework, of the study employed three major steps according to Lundy et al. (2012) as they reinforce each other in the Ghanaian fisheries value chain (Figure 2). First is the production process which starts with the supply of input towards production, before processing and delivery are carried out and then it ends with the consumers (Austin, 1992; Kaplinsky and Morris, 2001). This stage is made up of the main actors/entrepreneurs in horizontal linkages and the interactions between actors, the partnerships and contractual ties that decide the manner in which the products are exchanged between the various phases and the judgement on the overall character of the chain (Gereffi, 2004; FIAS, 2007; Tamasese, 2009). There are also ties demonstrating the movement of goods on the chain from the fishermen to the consumer. On these linkages assessments of the value addition methods and the cost of value addition are determined (FAO, 2005; Muluken, 2014) and analysis done on who makes the most gains on the chain, the mode of distribution of returns and measures to ensure evenness along the chain (Tulsian, 2014). This is achieved by evaluating the profitability along the chain, which helps to determine the governance structure of the chain (Schipmann, 2006). Factors affecting the pricing and purchase are also determined, as well as the reliance of fishermen on the croakers.

The second is the enabling environment (value chain influencers). There are influences emerging from formal and informal systems (national and local authorities, research bodies, etc. and from organisations (policies, economics, legislation and cultural practices) which are beyond the immediate reach of the value chain's economic actors. This specifically influences the processes of the value chain (Hellin and Meijer 2006). Such systems may promote the growth of the value chain, restrict, or make it neutral.

The third is the value chain support service providers. These are partner networks of organisations (public or private) or individuals who are not involved in the key phases of the value chains, but play important role in shaping up the business to allow the chain to perform effectively. The goal of this support service is to strengthen the various linkages and promote the growth of the enterprise by providing services to support the various actors on the chain to enhance the business. Example is the transport service operators. The relationships between the chain operators with both chain enablers and chain support service providers are assessed to enable chain upgrade.

The proposed value chain activities on the map are related to the actual mode of analysis (Monteiro, Pereira, Branco & Reis, 2017), and the basis for this current research. Figure 2 shows the conceptual framework of the study that reflects the order of analysis of the croaker fisheries value chain.

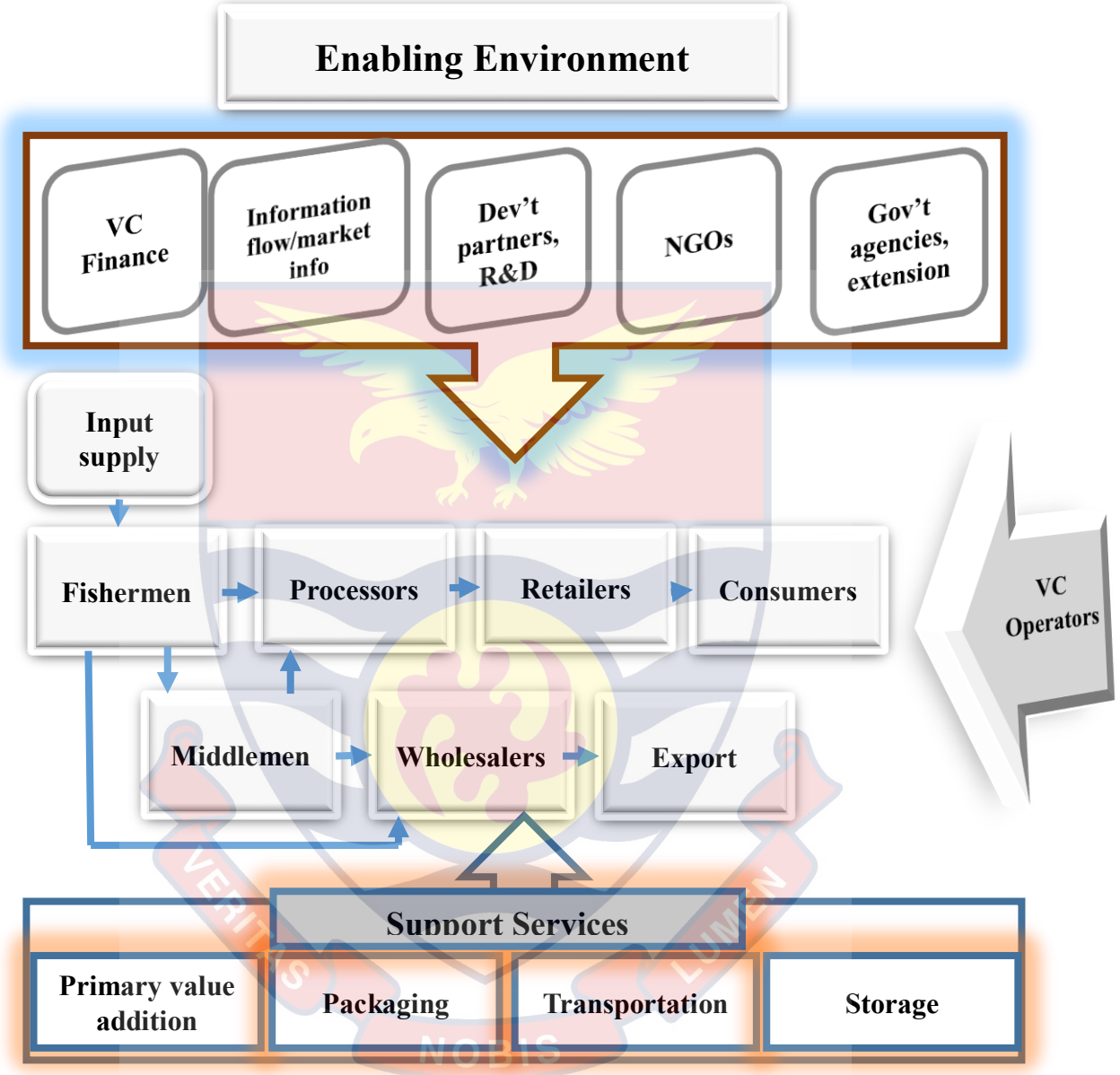


***Figure 2*: Value Chain Map of the Croaker Fishery**

Chapter Summary

This Chapter provided relevant literature from other writers who have concentrated on the various approaches to the work of the value chain and the various concepts in doing value chain analysis. It also focused on profitability

analysis, the value chain governance types, factors affecting pricing, value chain financing, post-harvest handling and various Governmental and Non-Governmental institutions working with the fisheries sector that led to the conceptual framework of the study. This review helps in discussing the current study.

CHAPTER THREE

MATERIALS AND METHODS

This Chapter elaborates the techniques used in the analysis. These involve selection of the research sites, research design, identification of the target group (study population), sources of data, sampling procedures, data collection instruments, pre-testing and ethical considerations, data processing and analysis, as well as limitations encountered during the fieldwork.

Sampling Sites

Data were obtained from Abrofo Mpoano in Cape Coast and the fish landing quay at Elmina, both in the Central Region. Also in the Western Region, data were obtained from Albert Bosumtwi-Sam Fishing Harbour at Sekondi and Anlo Beach, near Shama (Figure 3). The four landing beaches were chosen purposively mainly on two grounds: First, they all have the specific fish species (the croakers) and the kinds of fleets that the study is entirely centred on. Secondly, the landing beaches were chosen due to proximity, accessibility and also limited time factor. The study was conducted between January 2017 and August 2018, however, the data collection period was from November 2017 to April 2018 as the harvest of the croakers are seasonal and were harvested extensively during this period.

Profile of Study Sites

Cape Coast

Cape Coast is a fishing community, a Metropolitan District and the capital of the Central Region of Ghana. Economic activity includes fishing, trading and government administration (housed in the Castle). Cape Coast

metropolis occupies an area of 122 km^2 and its boundary to the West is Komenda-Edina-Eguafo-Abrem municipality, to the East is Abura Asebu-Kwamankese District, to the North, is Twifo-Hemang-Lower Denkyira District and the Gulf of Guinea to the South. Fishing is the main occupation of the people in this metropolis with the main fish species being the Threadfin (*Galeoides decadactylus*), Chub Mackerel (*Scomber colias*) and Burrito (*Brachydeuterus auritus*) among others (Dovlo et al. 2016). It has a lagoon on the edge of town and some of the most enticing swathes of beaches in the country. The town also produces industrial and agricultural products. One of the main trading and slave castles on the coast of Ghana is the Cape Coast Castle. The castle is listed as a World Heritage Site. The city was founded in the 15th century by the Portuguese.

Elmina

Elmina covers an area of 1,372.45 km^2 with an estimated population of 112,435 people. The main occupation of the people in this municipality is subsistence agriculture, fishing, salt processing and tourism. The main fish species caught are Atlantic little tuna (*Euthynnus alleteratus*) Frigate mackerel (*Auxis thazard*) and Burrito (*Brachydeuterus auritus*) among others (Dovlo et al. 2016). Also, Elmina castle is notable for the role in the transatlantic slave trade. Elmina is also home to Fort Coenraadsburg (Forte de Santiago) used for trading by the Portuguese in 1555.

Anlo Beach

Anlo Beach is in the Shama District of the Western Region and it is bordered to the North by the Mpohor Wassa East District, to the South by the

Gulf of Guinea, to the West by Komenda-Edina-Eguafo-Abirem District, and to the East by Shama which is the district capital. The predominant occupation of the people is mainly farming, trading and fishing. The main fish species caught are the sardinellas, Frigate Mackerel (*Auxis thazard*) and Long-finned Herring (*Ilisha africana*), the croakers among others. The community has always lived on the sand bar which separates River Pra and the associated wetland from the ocean. The community is gradually being washed away by sea waves. Anlo Beach is a fishing community and members are engaged in both marine and riverine fishing. In the past 30 years, more than 1,000 houses have been destroyed by the sea. It is one of many beautiful and clean beaches one can find in the country.

However, it had not been able to reap bountifully from its tourism potential due to ferocious attacks from incessant ocean surges as a result of climate change and rising sea levels.

Sekondi

Sekondi is the administrative capital of the twin city comprising Sekondi and Takoradi. Sekondi-Takoradi is the Western Region's largest city and an industrial and commercial center. The chief industries in Sekondi-Takoradi are fishing, timber, plywood, shipbuilding, and railroad repair. The main fish species caught are Sardines (*Sardinella aurita* and *Sardinella maderensis*), frigate Mackerel, (*Auxis thazard*) and long-finned Herring (*Ilisha africana*) among other species. Due to the huge discovery of oil in the Western region that has drawn major migration from people all over the world, Sekondi-Takoradi is unofficially called the Oil City of Ghana. There are a

number of beaches in Sekondi-Takoradi. Sekondi is also popular in Ghana for some of its famous forts, such as the Dutch Fort Orange (1642).

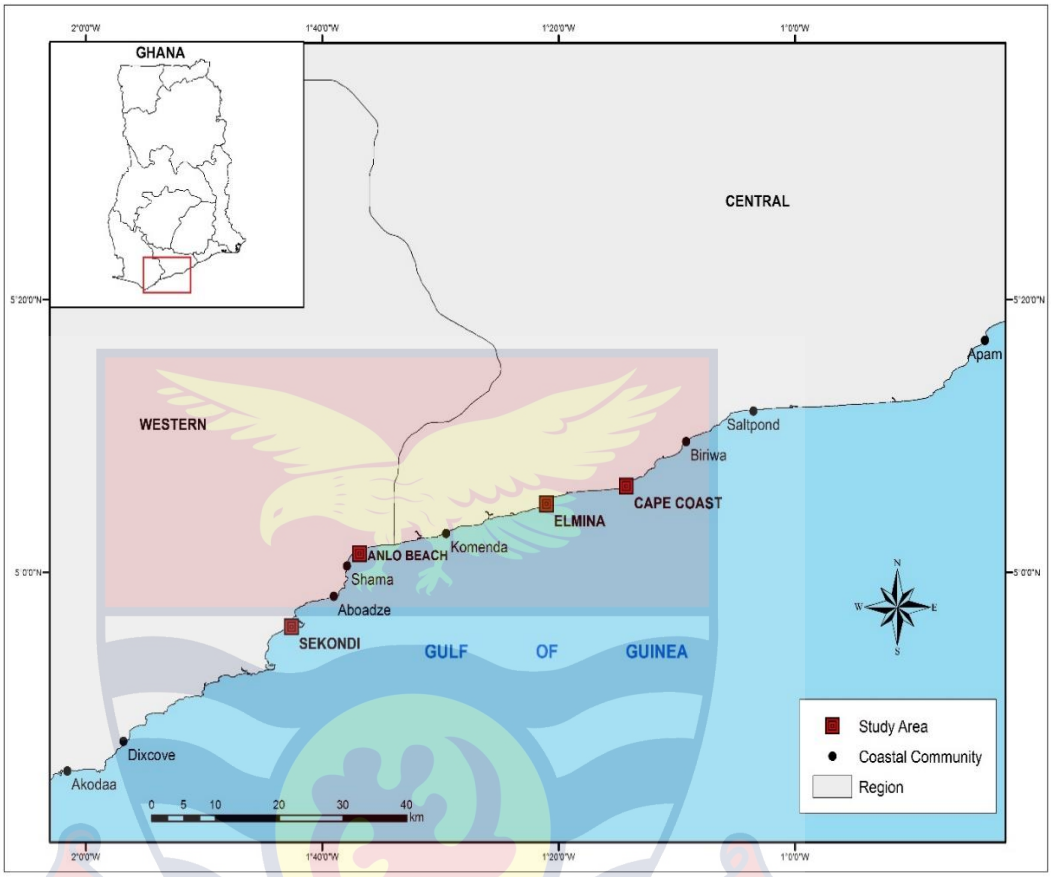


***Figure 3*: Map of Ghana showing the study sites at Sekondi, Anlo Beach, Elmina and Cape Coast**

(Credit: Centre for Coastal Management, UCC)

Research Design and Data Collection Instruments

A descriptive study design was adopted. Both qualitative and quantitative methods were used in this design to explain, record, analyse and interpret the prevailing conditions (Sarantakos, 2005). Questionnaires were designed for all the actors to source information from respondents.

Questionnaires were considered as the most appropriate means of collecting data for this study since factual information was desired (Best &

Khan, 2009). The items in the questionnaires were both closed and open ended which elicit both quantitative and qualitative methods of sourcing information.

The mixed method was appropriate for the study because it afforded explanations on the actual activities of the respondents regarding the value chain of the croakers. At the same time, it offered a meaningful image of events and tried to clarify the attitudes and actions of people based on collected data (Ponterotto, 2005; Fraenkel and Wallen, 1993).

According to Cohen, Manion and Morrison (2010), it is ideal to first explain the purpose of the study to the respondents and secondly to assure them of their anonymity, confidentiality and finally, give them maximum time to respond to every item on the questionnaire. Figures 4 and 5 show interviews with a croaker fisherman and a fish processor. Participant observation was also used as this gives a better awareness of the features of the research.

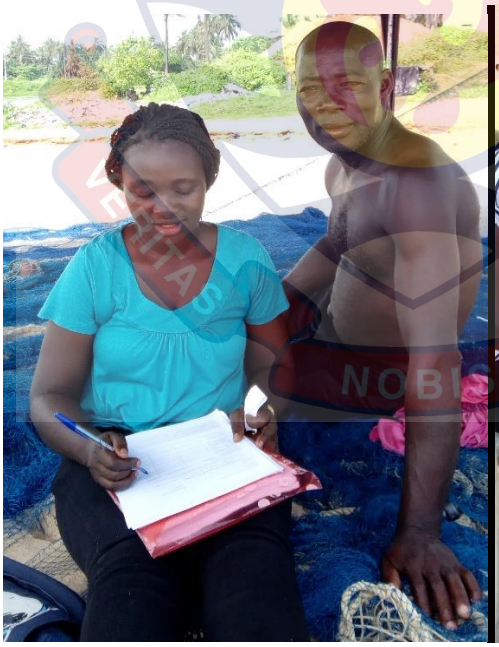


***Figure 4*: An interview with a fisherman *Figure 5*:An interview with a fish processor**

Target Population

The target population included fishermen, fish processors, fish traders (wholesalers, middlemen and retailers) and consumers from all the research sites (Tables 2 & 3). The number of respondents (actors) engaged in the fishing business was facilitated by the community secretaries to the fishing and processing businesses. Service providers such as NGOs (CEWEFIA, Hen Mpoano, Friends of the Nation), financial institutions such as Lower Pra Rural Bank, Akatekyiman Rural Bank, Ahantaman Rural Bank and Kakum Rural Bank were also interviewed to identify the kinds of support services they render to the value chain actors.

The accessible population of the study included the respondents in the Central and Western regions of Ghana since that was where the research was actually conducted.

Pre-test and Ethical Considerations

A pre-test exercise of the research was carried out at Moree, a nearby fishing community which is about 12 Km from Cape Coast, to assess the clarity of questions, likely responses and possible challenges during the actual data collection exercise. It assessed content validity of the instruments and it indicated how reliable the instruments were.

The total number of demersal fishers with croakers as their target species was obtained from the fishing groups. In each community, a meeting was arranged with the chief fishermen and processors to make the intentions the research known to the respondents and to solicit their cooperation.

Samples and Sampling Procedures

A total of five hundred and thirty (530) respondents being fishermen (300) and processors (230) were interviewed in the four communities using the Table of determining sample size proposed by Cohen, Manion and Morrison (2010). Respondents were selected randomly to be involved in the study. The sample size illustrated in Table 2 was then arrived at. In addition, 45 wholesalers, 40 middlemen and 40 consumers were interviewed (Table 3). The primary data was obtained from in-depth interviews of all the respondents. To group the target population in the communities, stratified sampling technique was used (Creswell, 2012). In a nutshell, multi-stage sampling methodology was used in the analysis. The first stage of the sampling involved stratifying the landing beaches into homogeneous strata. To ensure an equal distribution of respondents from each stratum, the stratified random sampling was used to pick respondents from each stratum at the second stage using the formula:

$$n_s = \frac{N_p}{N} * n$$ (Cohen, Manion and Morrison, 2010)

Where:

n_s is the sample size for each stratum,

Np is the population size for each stratum,

N is the total population size, and

n is the total sample size required for the study.

From the above equation, the total number of respondents from each landing beach is given in Table 2.

Table 2: Population and Sample Size Distribution of the Fishermen Respondents

Landing beach	Population Size	Sample (n) Size
Anlo Beach	77	39
Cape Coast	96	50
Elmina Main	206	105
Sekondi	207	106
Total	**586**	**300**

Table 3: Sample Size Distribution of the other Respondents

Community	Population	Processors & Retailers	Wholesalers	Middlemen	Consumers
Anlo Beach	74	30	10	10	10
Cape Coast	86	36	10	10	10
Elmina	195	81	11	10	10
Sekondi	201	83	14	10	10
Total	**556**	**230**	**45**	**40**	**40**

Processors' daily incomes and expenditures were recorded and projected into the number of times of processing per week, running into the month, and for the entire croaker season, which was 6 months. Similarly, fishermen's daily incomes and expenditures were recorded and projected into

the number of times of fishing in a week, through to the month, and for the entire croaker season also for 6 months.

Data Analysis

The quantitative data was gathered and coded (i.e., assigning of numbers or codes to questions). Qualitative data was converted into quantitative data where applicable. Content analysis was also used. Data was entered into the Statistical Package for Social Sciences (SPSS) version 22 and Excel 2013 version sections for analysis.

The research objectives were analysed as follows:

Estimating the Economic Value of Croakers at the Landing Sites and Value due to Processing

The unit price (Kg) of the croakers was estimated by dividing the unit cost price by the unit quantity to establish the kilogram price at each landing site. Mathematically the unit cost per Kg was estimated as;

Unit Cost/Unit Quantity = Price/Kg

Value Addition

Added Unit Cost or Added Value = Total Value – Value at Landing Site

Figure 6 below shows the two types of croakers used in the study. Also, the various forms of post-harvest processing methods and the materials used are shown below.

Figure* 6: *Pseudotolithus typus (in front)* and *Pseudotolithus senegalensis (behind)

***Figure* 7:Primary Value Addition at the shore**

***Figure* 8: Degutted *Pseudotolithus* sp.**

***Figure* 9: Filleted bones of *Pseudotolithus* sp.**

***Figure* 10: Packaged filleted *Pseudotolitus* sp.**

***Figure* 11: Ice slabs used on fishing trips** ***Figure* 12: Ice cubes used for preserving fish**

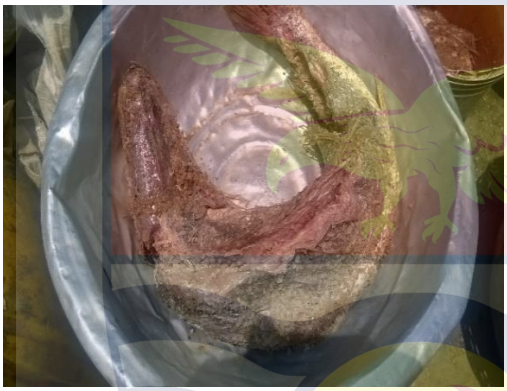


***Figure* 13: Salted *Pseudotolithus* sp.** ***Figure* 14: Smoked *Pseudotolithus* sp.**

***Figure* 15: The Chorkor oven** ***Figure* 16: The Morrison oven**

Figure **17: The Ahotor oven**

Figure **18: Sheets used in wrapping the croakers**

Establishing the Value Chain Market Map and Assessing Profitability of the Croaker Fishery

Establishing the Value Chain Map

The croaker fishery market map starts from the producers with the use of input, and through to the final consumer. A marketing structure map illustrating all the operational stages of the croaker fishery from pre-harvesting, harvesting through to the consumer, was presented to aid the analysis. This was done through interviews and observations. Hellin & Meijer (2006) offered a guide to the marketing map.

Assessing the Profitability of the Croaker Fishery

Gross Income Analysis

Gross income is the sum of all incomes received from selling, before any deductions, taxes, and other expenses were made.

$$\text{Gross Income} = \text{Net } Income + Total\ Expenditure \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where:

Total Expenditure = Marketing Cost + Value Addition

(Marketing costs = Labour/handling + transportation + market tolls + communication charges)

And:

Net Income

Is the difference between gross income (GI) and total expenditure

$$Net\ Income = Gross\ Income - Total\ Expenditure \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

A positive NI means that an enterprise is profitable and worth undertaking.

GI higher than the overall variable cost (total expenditure) means the enterprise is deemed efficient whiles a negative gross income value, suggests an economic loss (Abu, Abah, & Okpachu, 2011; Somda, Kamuanga, Münstermann, & Bittaye, 2003; Tiamiyu, Adagba, & Shaahu, 2014).

Estimating Unit Profit in Profitability

The unit price of croakers is the selling price per actor in the chain. The unit profit is estimated by dividing the gross profit by the total sales to obtain a ratio. The percentage total chain profit is the proportion of each actor's contribution to the total chain profit expressed as a percentage.

Profitability is expressed mathematically as:

$$\frac{\text{Gross profit}}{\text{Total sales}} \times 100$$

(Coulibaly et al. 2010)

A further calculation on Return on Investment (ROI) was done.

Estimation of Return on Investment

To identify the financial position of an actor compared to other actors in the chain, the return on investment (ROI) was calculated. The return on investment (ROI) is estimated by dividing the profit created by the actors by the unit cost incurred in producing an output. This is presented mathematically as;

$$\text{ROI} = \frac{\text{Current value of investment} - \text{Cost of investment}}{\text{Cost of investment}}$$

Net Present Value

The difference between the current value of cash inflows and the present value of cash outflows over time is the net present value (NPV). NPV is used in capital budgeting and investment planning to analyze the profitability of a project (Kenton & Mansa, 2020).

The Net Present Value of the fishery was projected using the following formula:

$$\text{NPV} = \sum_{1}^{n} (B_n - C_n) * \frac{1}{(1+r)^t}$$

Where:

(4)

n = Number years being projected – 1; 30 -1 = 29

B_n = Gross benefit or income

C_n = Expenditure or production cost

$\frac{1}{(1+r)^t}$ =

Discount Rate or Discount Factor ; where,

t = Time/year of measurement

r = Bank interest rate (Bank of Ghana) i.e. 16% or 0.16

NPV>0 = Profitable, NPV<0 = Not Profitable, NPV = 0 – Break even

Only investments with positive NPV values are accepted.

Determining the Power Relation along the Value Chain

The relationships of power on the chain was compared to Gereffi (2004), to determine the ruler of the chain. The author identified the following along the chain leading to the governance structure, and these were used to determine the governance structure of the chain.

- Power relations
- Dominant party/actor(s)
- Determinants of overall character of the chain
- Coordination, interactions between the links
- Upgrade

Analysis of Factors that Influence Pricing, equity; and Consumers' willingness to purchase the Croaker fish

For Basic Linear Regression, the Ordinary Least Squares (OLS) approach was used (Alto, 2017). For Factors influencing the price and equity of croakers, the study equation (1) was estimated as follows:

$$PC_i = \alpha_0 + \alpha_1 \text{Experience}_i + \alpha_2 \text{Artisanal}_i + \alpha_3 \text{Operational cost}_i + \alpha_4 \text{customer Relationship}_i + \alpha_5 \text{gender}_i + \alpha_6 \text{Price information}_i + \alpha_7 \text{Loc}_i + \varepsilon_i \quad \ldots (1)$$

Where:

PC is price of croakers

Description and measurement of variables

Experience: This variable is categorical in nature. It captures the level of experience a fisherman has attained. The categories of experience are; below 5 years, 5-10 years, 10-15 years, 15-20 years and above 20 years. Here, those with experience below 5 years are used as the base category.

Artisanal: This variable is dummy in nature with value of 1 if the artisan is industrial and 0 otherwise

Operational cost: This variable is a continuous variable capturing the operational cost in years of the fishing. This explained the fisherman's expenditure on fishing trips. This affects the income for the fishermen positively or negatively depending on the season. For easy interpretation, the variable is log-transformed

Location: This captures the fishing community in which the respondent lives. It is, thus, a categorical variable consisting of Sekondi, Anlo beach, Cape Coast and Elmina, with those living in the Sekondi areas set as the base category.

Gender: This variable is the gender of the respondent measured as a dummy with 1 if the respondent is a female and 0 if male**.**

Price information: This captures how the price of the fish is determined. It is a categorical variable consisting of self-determined, bargaining, customer determined, sponsor determined and fixed pricing. Respondents whose prices of fish are self-determined served as the base category.

The croakers were priced in Ghana cedis and converted to dollars ($) (2017 BoG rate).

Consumers' willingness to pay was assessed through quantitative interviews and presented in percentage.

Factors Affecting Consumer Purchase of the Croakers

To analyse the aspects of consumer characteristics that influence the quantity purchased and consumption of fish, the study estimated equation (2) as follows:

$$CC_i = \alpha_O + \alpha_1 \text{income}_i + \alpha_2 \text{Edu}_i + \alpha_3 EMP_i + \alpha_4 \text{Age}_i + \alpha_5 \text{Sex}_i + \alpha_6 \text{marital status}_i + \varepsilon_i \quad .. (2)$$

Where: *CC* is consumer characteristics

Factors (characteristics) such as income levels, age, sex, educational level and type of employment were assessed against the purchase of the croakers.

Assessment of the Level of Economic Reliance on Croakers by Fishermen

The proportions of the fishermen's Total Monthly Incomes (TMI) on fisheries (net incomes/month) and incomes on croakers/month were calculated in dollars ($) as follows:

Net income (NI) = Incomes from all species harvested (1)

Income from Croakers = Net Income – Income from other species (2)

Net Income = Gross output - Cost of Production (3)

Cost of Production/Operational Cost (Op. Cost):

Cost of Production = $\sum(a_1 + b_1 + c_1 + d_1)$

Where:

a_1 is the cost of labour for crew

b_1 is the cost of maintenance

c_1 is the cost of fuel

d_1 is the cost of ice cubes

The percentage proportion of income from croakers was calculated as follows:

Percentage proportion of income from croakers in net income from fisheries =

$$\frac{\text{Income from croakers}}{\text{Net income}} \times 100$$

This was represented graphically to show the relationships between the two variables and to determine the economic contribution of the croakers to the fisherman's income.

Examination of Constraints and Opportunities in the Croaker Fishery

Questionnaires were designed to source information from all the respondents (value chain operators/actors) about the constraints and opportunities in the croaker fishery. The responses were evaluated using SPSS software version 22 and Excel 2013 version. These were graphically

presented. The appropriate interventions were identified and recommended for various institutions that support the croaker fishery.

Study Limitations

Among the study limitations encountered were that some respondents argued that previous engagements yielded no tangible results while others bemoaned lack of direct financial benefits from such interviews. Also, most of the respondents did not keep financial records and so much time was spent in going through their daily activities with them to understand the trend and do evaluations. Again, respondents refused to be recorded due to the fear of being victimized.

Chapter Summary

This Chapter was dedicated to presenting information on the compilation and examination of data approaches for the study. Information on the sampling sites and study structure, target population and procedures for sampling were obtained. It also examined procedures in the collection and interpretation of data, and the study's limitations.

CHAPTER FOUR

RESULTS

This Chapter discusses the findings of the field study. The results have been presented to reflect the monetary value of croakers at the landing sites and also the estimated value due to processing have been provided. It shows the croaker market environment from the producers to the consumer level, the profitability of the croaker fishery along the value chain, analysis of factors

that influence pricing and equity; and consumers' willingness to purchase the croakers have also been presented in this section. This section also looks at the economic reliance on croakers by fishermen and evaluates the constraints and opportunities in the fishery.

The Economic Value of Croakers at the Landing sites and Value due to Processing

The croakers were harvested in different sizes. The small sizes often ranged from 30cm to 45cm, weighing between 290.3g and 382.2g each, while the medium sizes often ranged from 46cm to 70cm with weight from 768.2g and above. The large sizes often ranged from 75cm to 145cm (and above), weighing between 4kg to 16.8kg, and above. Table 4 shows the monetary value of croakers at the landing sites and value due to processing ($/Kg) in all the study communities. From Table 4, the least value of the croakers was encountered at Anlo Beach landing site (estimated at $2.40/Kg) whiles the highest value was recorded at Cape Coast landing site (estimated at $3.00/Kg). With the processing methods, salting recorded the least cost of value addition (estimated at $0.12/Kg) at Sekondi whiles the highest cost of value addition were both from filleting and smoking (estimated at $0.60/Kg) at Sekondi and Cape Coast respectively.

Table 4: Value of Croakers at the Landing sites and Value due to Processing

Anlo Beach

Type of fish processing	Total Number of Respondents (30)	Value at landing site ($/Kg)	Value addition ($/Kg)	Total Value ($/Kg)
Smoking	20	2.40	0.30	2.70

Salting	3	2.40	0.14	2.54
Frying	2	2.40	0.36	2.76
Fresh Fish	5	2.40	0.36	2.76

Cape Coast

Type of fish processing	**Total Number of Respondents (36)**	**Value at landing site ($/Kg)**	**Value addition ($/Kg)**	**Total Value ($/Kg)**
Smoking	15	3.00	0.60	3.60
Salting	4	3.00	0.30	3.30
Frying	6	3.00	0.80	3.80
Filleting	3	3.00	0.20	3.20
Fresh Fish	8	3.00	0.30	3.30

Elmina

Type of fish processing	**Total Number of Respondents (81)**	**Value at landing site ($/Kg)**	**Value addition ($/Kg)**	**Total Value ($/Kg)**
Smoking	56	2.70	0.30	3.00
Salting	10	2.70	0.20	2.90
Frying	2	2.70	0.36	3.06
Filleting	3	2.70	0.13	2.83
Fresh Fish	10	2.70	0.36	3.06

Sekondi

Type of fish processing	**Total Number of Respondents (83)**	**Value at landing site ($/Kg)**	**Value addition ($/Kg)**	**Total Value ($/Kg)**
Smoking	49	2.70	0.30	3.00

Salting	10	2.70	0.12	2.82
Frying	10	2.70	0.50	3.20
Filleting	4	2.70	0.60	3.30
Fresh Fish	10	2.70	0.30	3.00

Source: Field survey (2018)

Below (Figure 19) is the framework of the croaker fish market. The map shows the marketing channels of the croaker fishery starting from the point of purchase (fishermen) to the ultimate channel for marketing; the rural consumers, peri-urban consumers, urban consumers and the regional/international consumer market (export). The major supporting institutions were financial givers, NGO partners, sources of pricing information and governmental agencies.

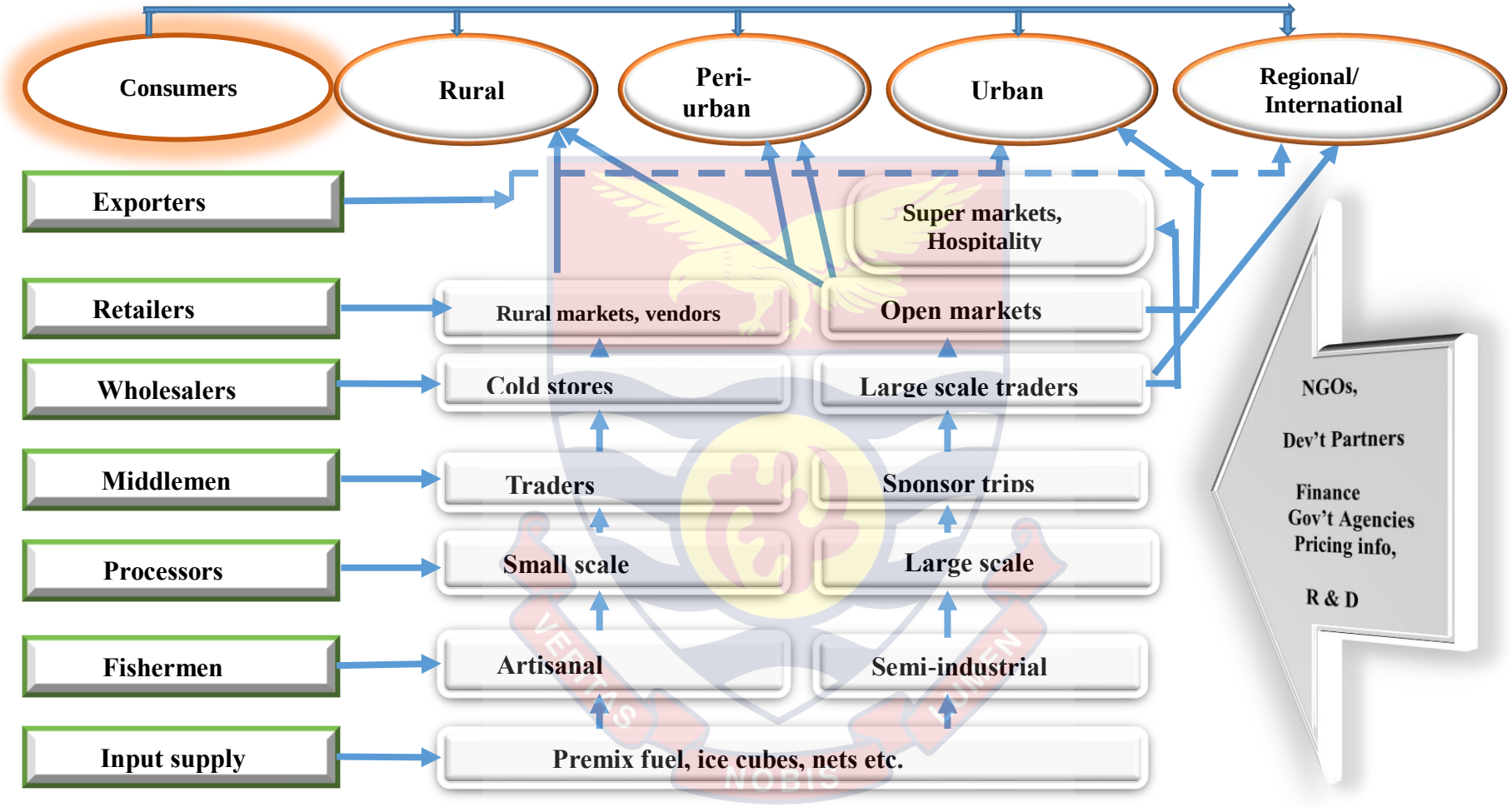


Figure 19: Market Map of the Croaker Fishery. The concept adapted from Hellin and Meijer (2006)

Source: Field Survey (2018)

Profitability of Croaker Fishery along the Value Chain

In Table 5, the value added, marketing cost, the total expenditure, gross income and the net income made per community are shown, and that led to the percentage profitability analysis.

Table 5: The Value Addition and the Net Income per Kg of the Croakers among Processors and Retailers Anlo Beach

Processing Method	Price/Kg $	Value Addition ($/Kg)	Marketing Cost ($/Kg)	Total Exp. ($/Kg)	Gross Income ($/Kg)	Net Income ($/Kg)
Smoking	2.40	0.30	0.06	2.76	4.34	1.58
Salting	2.40	0.14	0.06	2.60	4.46	1.86
Frying	2.40	0.36	0.06	2.82	4.70	1.88

Processed type	Retail Price/Kg ($/Kg)	Marketing Cost ($/Kg)	Total Exp. ($/Kg)	Gross Income ($/Kg)	Net Income ($/Kg)	Consumer Price ($/Kg)
Smoking	4.34	0.29	4.63	5.63	1.00	5.63
Salting	4.46	0.29	4.75	6.20	1.45	6.20
Frying	4.70	0.59	5.29	6.76	1.47	6.76

Cape Coast

Processing method	Price/Kg ($)	Value Addition	Marketing Cost	Total Exp. ($/Kg)	Gross Income	Net Income ($/Kg)

		($/Kg)	($/Kg)		($/Kg)	
Smoking	3.00	0.60	0.03	3.63	6.30	2.67
Salting	3.00	0.30	0.05	3.35	5.00	1.65
Frying	3.00	0.80	0.05	3.85	6.10	2.25
Filleting	3.00	0.20	0.03	3.23	6.70	3.47

Processed type	**Retail Price/Kg $**	**Marketing Cost ($/Kg)**	**Total Exp. ($/Kg)**	**Gross Income ($/Kg)**	**Net Income ($/Kg)**	**Consumer Price ($/Kg)**
Smoking	6.30	0.30	6.60	8.40	1.80	8.40
Salting	5.00	0.40	5.40	7.00	1.60	7.00
Frying	6.10	0.50	6.60	8.10	1.50	8.10
Filleting	6.70	0.50	7.20	8.90	1.70	8.90

Elmina

Processing method	**Price/Kg ($)**	**Value Addition ($/Kg)**	**Marketing Cost ($/Kg)**	**Total Exp. ($/Kg)**	**Gross Income ($/Kg)**	**Net Income ($/Kg)**
Smoking	2.70	0.30	0.06	3.06	4.90	1.84
Salting	2.70	0.20	0.06	2.96	5.70	2.74
Frying	2.70	0.36	0.06	3.12	4.96	1.84
Filleting	2.70	0.13	0.03	2.86	5.38	2.52

Processed type	**Retail Price/Kg**	**Marketing Cost**	**Total Exp. ($/Kg)**	**Gross Income**	**Net Income**	**Consumer Price**

	$	($/Kg)		($/Kg)	($/Kg)	(S/Kg)
Smoking	4.90	0.20	5.10	7.35	2.25	7.35
Salting	5.70	0.36	6.06	8.16	2.10	8.16
Frying	4.96	0.40	5.36	7.56	2.20	7.56
Filleting	5.38	0.48	5.86	11.86	6.00	11.86

Sekondi

Processing method	**Price/Kg ($)**	**Value Addition ($/Kg)**	**Marketing Cost ($/Kg)**	**Total Exp. ($/Kg)**	**Gross Income ($/Kg)**	**Net Income ($/Kg)**
Smoking	2.70	0.30	0.06	3.06	8.20	5.14
Salting	2.70	0.12	0.06	2.88	7.82	4.94
Frying	2.70	0.50	0.06	3.26	8.60	5.34
Filleting	2.70	0.60	0.05	3.35	16.10	12.75

Processed type	**Retail Price/Kg $**	**Marketing Cost ($/Kg)**	**Total Exp. ($/Kg)**	**Gross Income ($/Kg)**	**Net Income ($/Kg)**	**Consumer Price ($/Kg)**
Smoking	8.20	0.48	8.68	11.48	2.80	11.48
Salting	7.82	0.29	8.11	10.41	2.30	10.41
Frying	8.60	0.36	8.96	13.76	4.80	13.76
Filleting	16.10	0.48	16.58	21.58	5.00	21.58

Fresh	Price/Kg ($)	M.C. /VA ($/Kg)	Total Exp. ($/Kg)	Gross Income ($/Kg)	Net Income ($/Kg)	Consumer Price ($/Kg)
Wholesale/ middlemen	2.70	0.50	3.20	4.37	1.17	4.37

*Exp-Expenditure, M.C.-Marketing Cost, VA- Value Addition

Table 6 shows the percentage profitability per Kg/$ made on the sale of the croakers at each of the study sites. From the Table, Sekondi recorded the highest percentage profit margins on all the processed fish. The highest percentage profit margin was recorded on filleting at Sekondi while the least percentage profit was on smoking at Anlo Beach.

Table 6: The percentage profit made on the croakers per Kg for both fresh and processed products in all the communities

Community	Smoking	Salting	Frying	Filleting
Anlo Beach	36%	41%	40%	
Cape Coast	42%	33%	36%	51%
Elmina	37%	48%	37%	53%

Sekondi	62%	63%	62%	79%

Retail

Community	Smoking	Salting	Frying	Filleting
Anlo Beach	18%	23%	22%	
Cape Coast	21%	22%	18%	19%
Elmina	31%	26%	29%	50%
Sekondi	24%	22%	35%	23%

Fresh	Price/ Kg ($)	M.C. /VA ($/Kg)	Total Exp. ($/Kg)	Gross Income ($/Kg)	Net Income ($/Kg)	Consumer Price ($/Kg)	% Profit ($/Kg)	Retail
***Wh/ Mm**	2.70	0.5	3.20	4.37	1.17	4.37	26%	18%

*Wh – Wholesalers, Mm – Middlemen

Source: Field Survey (2018)

Return on Investment (ROI)

Table 7 shows the ROI figures for the processors and fresh fish sellers at the study areas. Sekondi recorded the highest values on the ROI for the processing methods 167%, 171%, 168% and 380% respectively for smoking, salting, frying and filleting. This was followed by Elmina. At Cape Coast, smoking and filleting made higher gains whiles the processors at Anlo Beach also made appreciable profits on the products. The wholesalers and middlemen had uniform pricing/Kg due to the use of weighing scales.

Table 7: Return on Investment (ROI) for the various Croaker products (per Kg) in the Communities Processing methods

Communities	Smoking ($/Kg)	Salting ($/Kg)	Frying ($/Kg)	Filleting ($/Kg)
Anlo Beach	57%	71%	66%	
Cape Coast	73%	41%	58%	107%
Elmina	60%	92%	59%	88%
Sekondi	167%	171%	168%	380%

Retail

Communities	Smoking	Salting	Frying	Filleting
Anlo Beach	21%	30%	28%	
Cape Coast	27%	30%	22%	23%
Elmina	38%	35%	41%	102%
Sekondi	32%	28%	53%	30%

Actors	Price/Kg ($)	Exp.	Total Exp.	Gross Income	Net Income	ROI
Wholesalers/ middlemen	4.63	0.50	5.13	7.00	1.87	36%

*Exp-Expenditure

Source: Field Survey (2018)

Net Present Value (NPV) and yearly Return on Investment (ROI)

Figures 20-23 provide an overview of the annual NPV of the croaker fishery in relation to the yearly ROI over a 30-year period at the study sites. The discount factor (is a decimal number multiplied by a cash flow value) helps to discount cash flow back to its present value. From the assessment, it is indicative that Sekondi offers a more stable environment for the croaker

business to thrive along the value chain in terms of profits due to the higher NPVs and earlier return on investments (ROI) especially among the fish processors.

The data also depicts Sekondi generally has higher economic values (NPVs) as a result of a generally profitable industry along its value chain involving the fishers, processors, wholesalers through to the retailers. This observation is contrary to the observation for Anlo Beach, Cape Coast and Elmina that depict varied levels of market uncertainty and economic stability along the value chain.

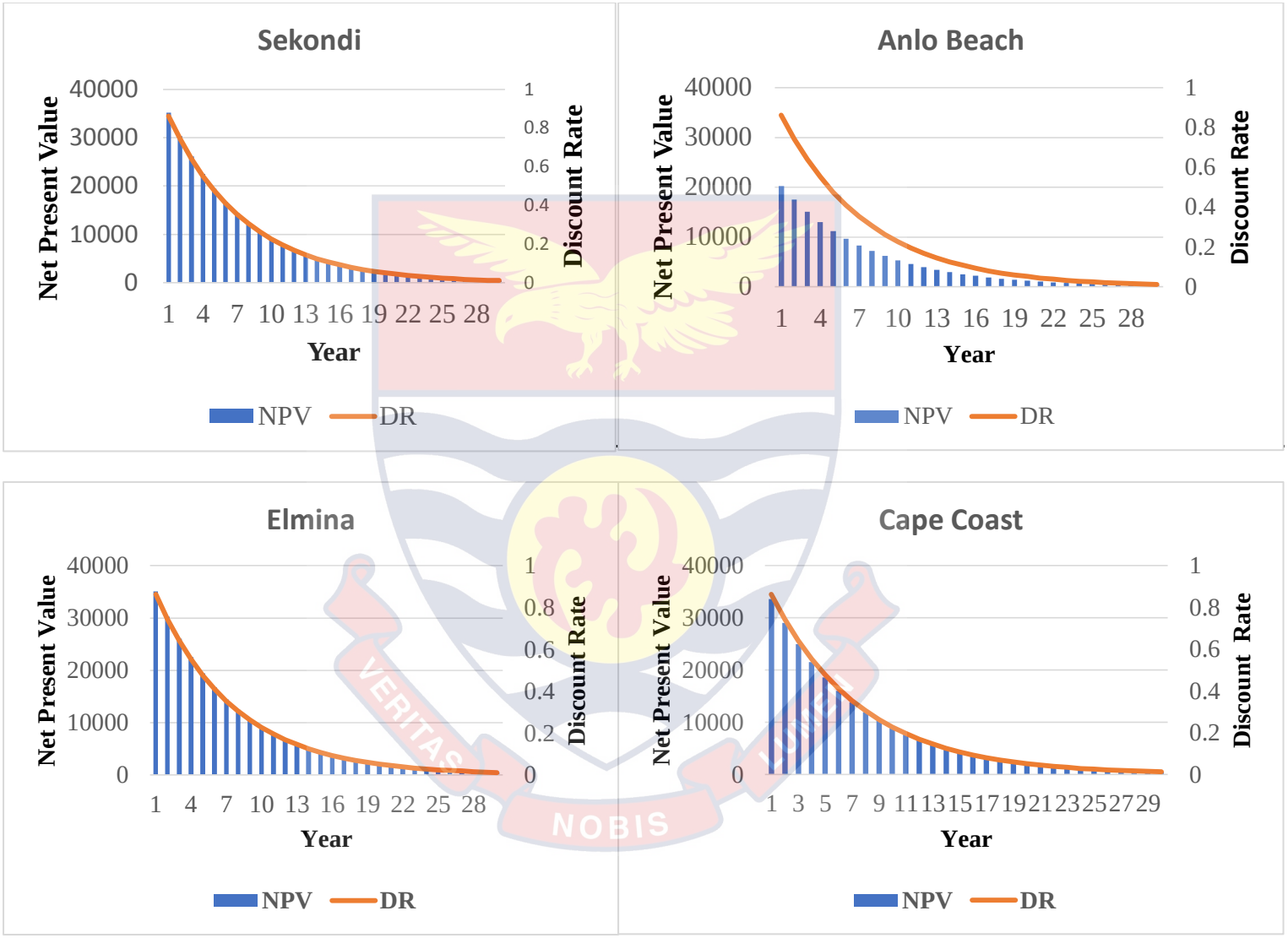


***Figure* 20: Net Present Value of croaker fishery among fishermen at the study sites**

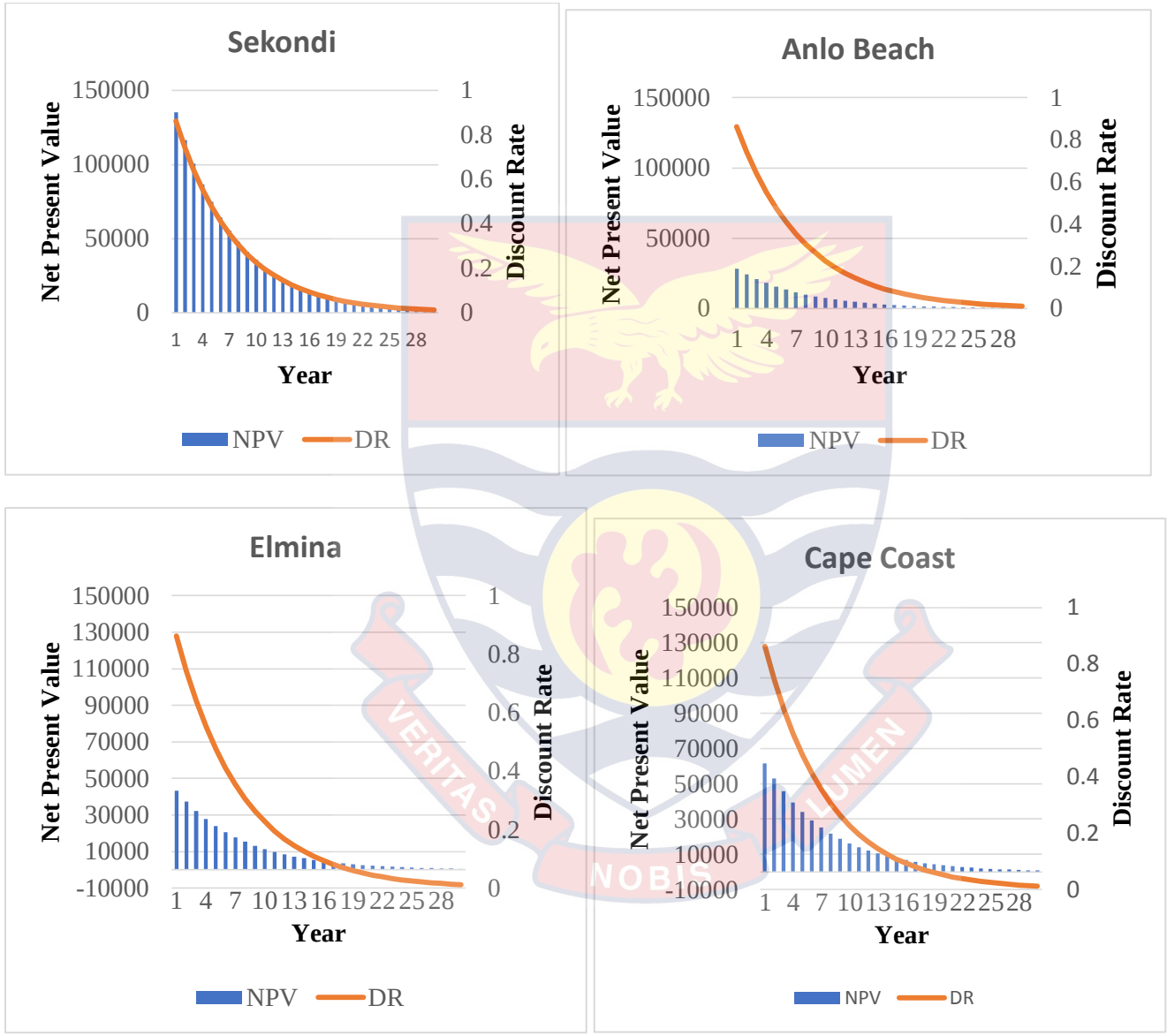


***Figure 21*: Net Present Value of croaker fishery among fish processors at the study sites**

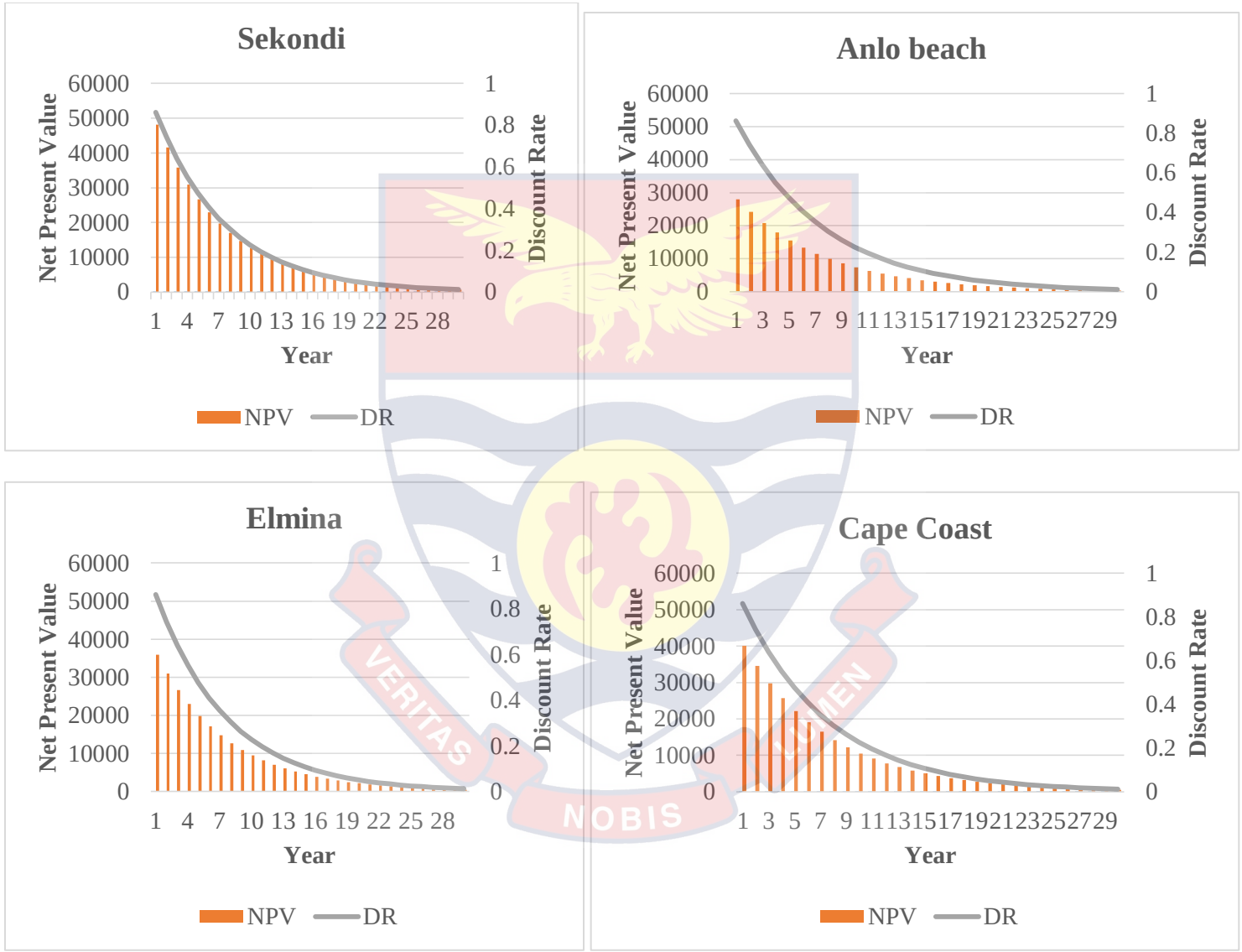


***Figure* 22: Net Present Value of croaker fishery among fish wholesalers at the study sites**

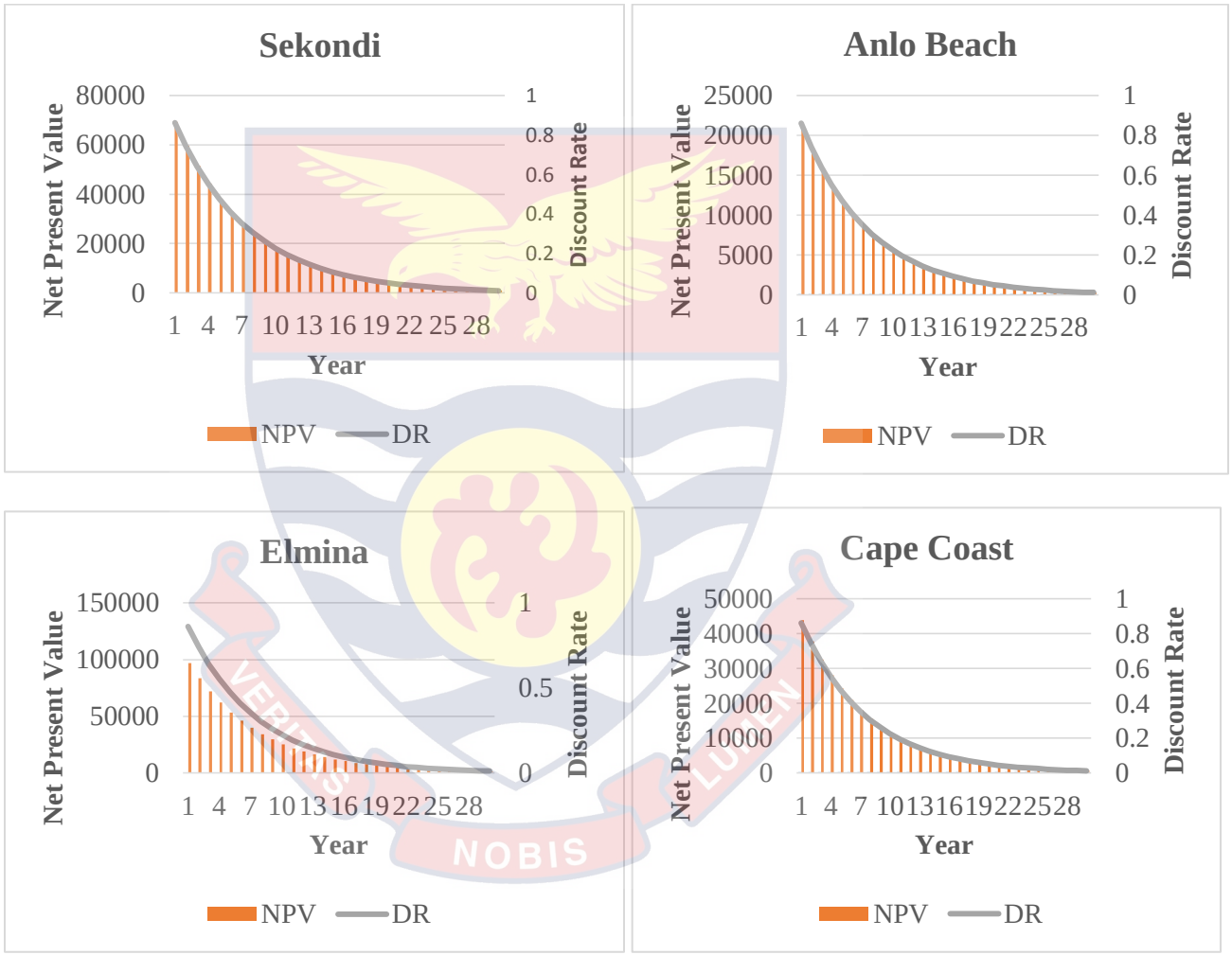


***Figure 23*: Net Present Value of croaker fishery among fish retailers at the study sites**

Figures 20, 21, 22 and 23 show the annual NPV among the actors in all the study sites, showing the ROI period of the croaker fishery. The graphs show the NPV, the discount factor and the ROI years of break-even.

Table 8 shows the annual NPV and the ROI period of the croaker fishery business at the study sites. From the Table, the ROI among the chain actors was estimated on average at 17 years by the fish processors with recorded values of NPVs highest in Sekondi. It is therefore generally concluded that, it is more profitable to consider fish processing as a business in all the study sites among the value chain actors.

Sekondi	NPV ($)	ROI (years)	Ranking
Fishermen	35,154.00	29	4
Processors	135,331.53	17	1
Wholesalers	48,170.00	28	2
Retailers	69,292.00	28	2

Elmina	NPV ($)	ROI (years)	Ranking
Fishermen	35088.35	28	4
Processors	43,326.80	17	1
Wholesalers	35,882.00	27	3
Retailers	96,979.00	25	2

Anlo Beach	NPV ($)	ROI (years)	Ranking
Fishermen	20,283.06	27	3
Processors	28,418.00	17	1
Wholesalers	28,051.00	27	3

Table 8: Rankings of the annual average NPV ($) and ROI of Actors at the study sites

Cape Coast	NPV ($)	ROI (years)	Ranking
Fishermen	33,644.73	27	4
Processors	61,580.32	17	1
Wholesalers	40,033.00	26	3
Retailers	43,928.00	24	2
Retailers	20,701.00	25	2

Factors that influence Pricing and Equity; and Consumers' willingness to Purchase Croakers

Two kinds of analysis were done;

(i) factors influencing the pricing and equity of croakers and

(ii) determinants of consumers' purchase of croakers

Factors influencing Pricing and Equity of Croakers

Factors influencing the price of croakers involved variables such as the number of years of fishing experience, the type of fishing, the operational cost, method of payment, gender of buyers and price information. The P-value <0.0001, P-value <0.05, P-value <0.1 being significant at one percent, five and 10 percent respectively were used. This suggests that the p-value for the homoscedasticity test was insignificant at 5 percent. It also indicates that at 5 percent significant level, the model has no heteroscedasticity (it had a constant variance and a mean of 0). Table 9 shows the factors influencing the price of the croakers.

Table 9: Factors influencing the pricing and equity of the Croakers

Explanatory variable	Price (log) Coef.	Std. Err.	T	P>t	[95% Conf.	Interval]
Experience of fishers (ref=below 5 years)						
5-10 years	.0204	.2590	0.08	0.937	-.4895	.5304
10-15 years	-.0137	.14075	-0.10	0.922	-.2908	.2633
15-20 years	-.0340	.1166	-0.29	0.771	-.2637	.1956
above 20 years	-.0355	.1148	-0.31	0.757	-.2615	.1904
Artisanal (ref=semi-industrial)	-.1312	.0387	-3.39	0.001	-.2075	-.0549
Operational cost (log)	.0794	.0135	5.87	0.000	.0527	.1060
Relationship with buyers						
Outright payment	-.5108	.0613	-8.32	0.000	-.6316	-.3899
Both	-.5086	.0667	-7.62	0.000	-.6400	-.3773
Gender (ref=male)						
Female	-.0778	.0346	-2.25	0.025	-.1461	-.0096
Price information (Ref=self-determined)						
Bargaining	-.0839	.0289	-2.90	0.004	-.1408	-.0270
Customers determined	-.0358	.0814	-0.44	0.660	-.1961	.1245
Sponsors determined	-.0862	.0498	-1.73	0.085	-.1843	.0118
Fixed pricing	-.0420	.0930	-0.45	0.652	-.2251	.1411
Community (ref=Sekondi)						
Anlo Beach	-.2207	.0497	-4.43	0.000	-.3187	-.1227
Elmina	-.0802	.0367	-2.18	0.030	-.1526	-.0078
Cape Coast	-.1124	.0430	-2.61	0.009	-.1972	-.0277
_cons	6.2880	.1757	35.77	0.000	5.9419	6.6340

Homoscedasticity	0.312
Omitted variable bias	0.187
Multicollinearity (Mean VIF)	4.14
Observations	300
F(16, 283)	0.0000
R-squared	0.5026
Adj R-squared	0.4745
Root MSE	.2156

Note: Ref is the reference or base group. P-value <0.0001, P-value <0.05, P-value <0.1 is significant one percent, five percent and ten percent.

Table 9 presents results on the factors influencing the price of croakers. As shown in the Table, compared to fishermen who have experience in fishing below five years, those that have 5-10 years of experience had price of croakers increased by 2.04 percent but it was not significant. Again, the price of croakers increased by 1.3 percent, 3.4 percent and 3.6 percent for fishermen with 10-15 years of experience, 15-20 years of experience and more than 20 years of experience respectively. However, these were all not statistically significant. The implication of this finding was that experience of the fisherman had no statistically significant effects on fish prices.

Compared to fishermen that used semi-industrial type of fishing, fishermen that used artisanal type of fishing price of croakers fell by 13.1 percent and it was statistically significant at five percent, indicating the relevance of such variation. This finding implies that the type of fishing has a significant influence on the price

of the fish such that artisanal fishing type is relatively priced cheaper compared to the semi-industrial type of croaker fish.

The operational cost of fishing also had a major positive impact on the sale of the croakers. For example, a one percent rise in fishing operating costs increases the price of croakers by 7.9 percent and it was significant at one percent. The fisherman's relationship with buyers had a significant influence on the price of the fish. Traders bought the croakers either on credit or outright payment. For example compared to a trader who buys the croakers on credit, a trader who buys the croakers on outright payment experiences a price fall of 51.1 percent.

Prices of croakers were relatively cheaper with the females compared to the males. For instance, relative to a man, a woman's price for croakers reduced by 7.8 percent and it was significant at five percent. Price information of the croakers also significantly influenced the price of the croakers. For example, compared to a fisherman who self-determines the price of croakers, a fisherman who sells through bargaining for price experiences a price fall by 8.04 percent and it is significant at five percent.

On consumers' willingness to pay, 31 out of 40 respondents, representing 77.5% of consumers were of the view that a constant price per Kg for the croakers was ideal and that pricing should not be arrived at through bargaining.

Determinants of Consumers' Purchase of Croakers

Correlations analysis between consumer characteristics influencing quantities purchased and fish consumption are summarized in Table 10. Consumer characteristics (variables) such as income, age, sex, education, marital status, and

type of employment of consumers were assessed against the quantities of croakers purchased.

Table 10: Consumer characteristics influencing the purchased of croakers

	(1)
	Quantity purchase
VARIABLES	**coefficient**
Income	0.437***
	(0.039)
Age	0.274***
	(0.0816)
Sex	0.376**
	(0.192)
Secondary	0.376**
	(0.230)
Tertiary	0.658***
	(0.219)
Married	0.394*
	(0.218)
Single	0.139
	(0.262)
Social work	0.0635
	(0.378)
Self-employed	0.181
	(0.330)
Constant	0.893
	(0.870)

Observations	40
R-squared	0.459

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

From Table 10, consumer's income was assessed against the purchase of croakers. For every dollar ($) increase in consumers' income, the quantity of croaker purchased went up by 43.7% and this was statistically significant at 1% (base variable is income). With the age, it was observed that for every additional year in the age of the consumer, fish purchase increased by 27.4% and this was significant at 5%. Compared to males, female quantities purchase of croakers was 37.6% higher and this was significant at 1% (base category was male). Compared to a consumer with a primary school education or less, a consumer with a secondary school education's purchase increased by 37.6% which is significant at 1% whiles those with tertiary education had 65.8% which was statistically significant at 5% (base category was primary level of education).

Compared to those in NGOs, consumers who were social workers' quantity of purchase of croakers increased by 6.3% while self-employed persons had 18.1% increase in the purchase of croakers, though both were not statistically significant.

Economic Reliance on Croakers by Fishermen

The economic reliance on the croakers by the fishermen sought to investigate the dependency level of the fishermen on the croakers and the proportion of their incomes emanating from the croakers. Average monthly expenditure and income (USD) of the croaker fishery (Table 11) per person in

each community was estimated. From the Table, fishermen's expenditure included the cost of maintenance, fuel cost, labour cost and cost of ice cubes. Apart from Anlo Beach which neither used fuel nor ices cubes, all the other communities used fuel and ice as part of their expenditure or operational cost. The crew size ranged between 4 and 25 members (mostly on a rotational basis). The crew size was multiplied by the amount paid per day to arrive at the total wages paid. Accordingly, the total average cost of production of the fish (harvesting) was represented by the operational cost.

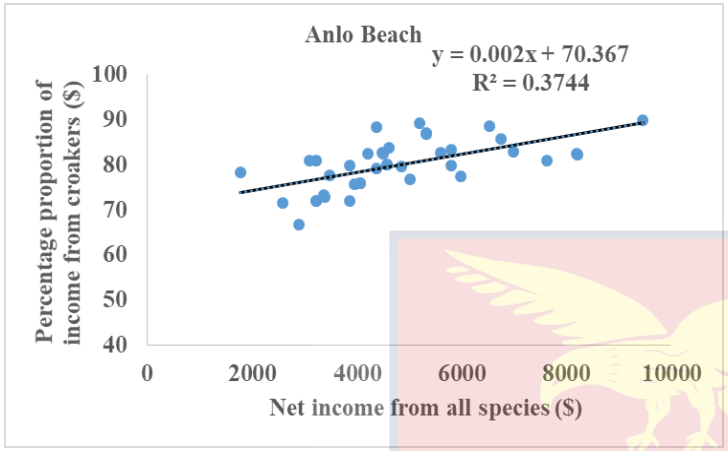
The net return on the sale of the fisheries represents the income from all species. The mean production values and incomes per community are represented in Table 11. The analysis shows that the croakers contributed a higher percentage of the total incomes of the fishermen at the research areas.

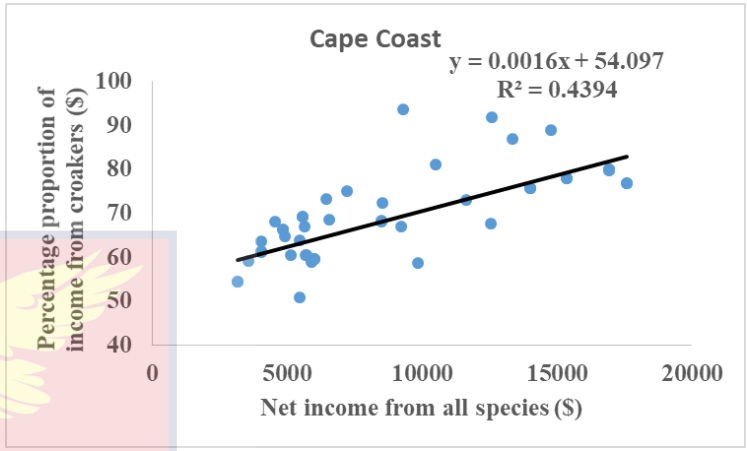
Table 11: Average Monthly Expenditure and Income (USD) of the Croaker Fishery per person in each Community (Economic Reliance of fishermen on croakers)

Community	Labour/ Crew	Maintenance	Fuel	Ice Cubes	Operational Cost	Gross Income	Net Income on Fisheries	Income on Croakers	Income on other jobs
Anlo Beach	866.84	43.56	-	-	910.40	4831.79	3921.39	2393.01	9.40
Cape Coast	1295.13	53.66	862.70	246.48	2457.99	8962.63	6504.64	4054.82	2.18
Elmina	1261.51	64.71	758.52	233.42	2318.18	9101.93	6783.74	4170.74	5.14
Sekondi	1302.68	53.36	742.18	247.39	2345.63	9142.16	6796.53	4291.53	15.63

N=300

Source: Field Survey (2018)





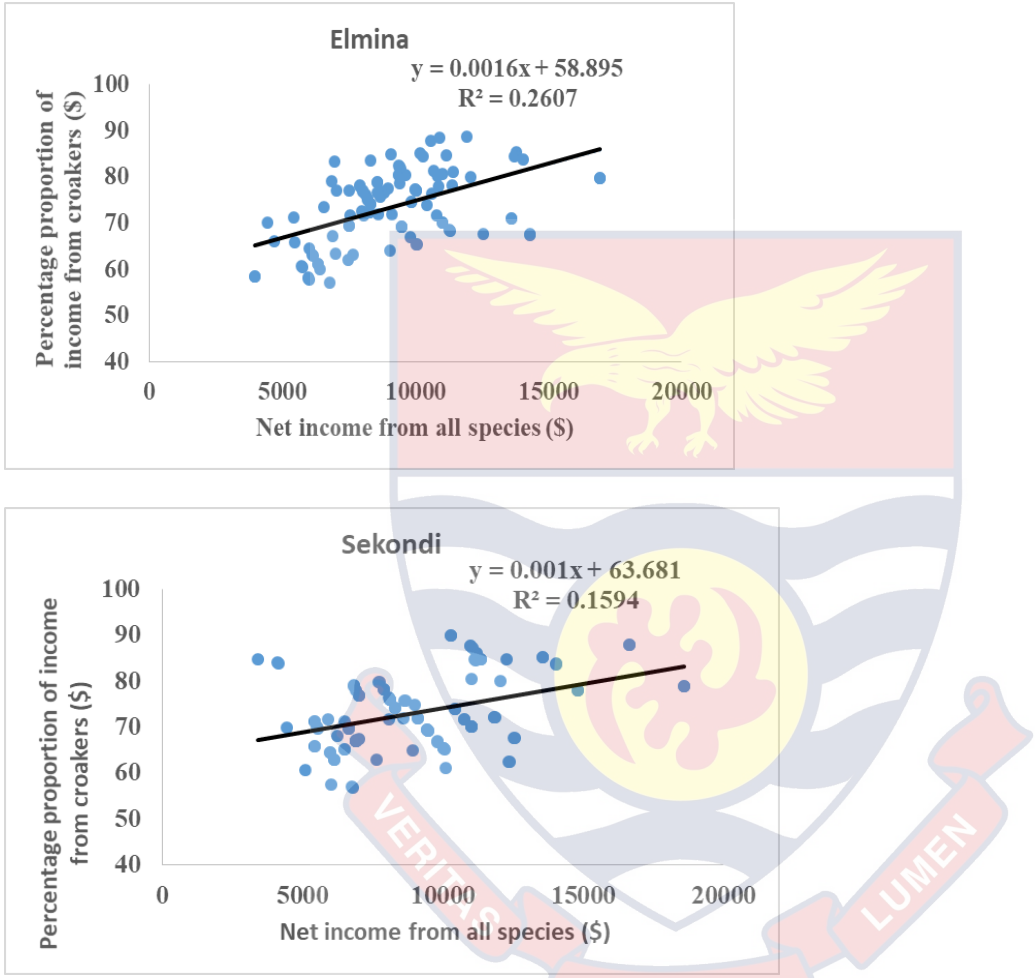
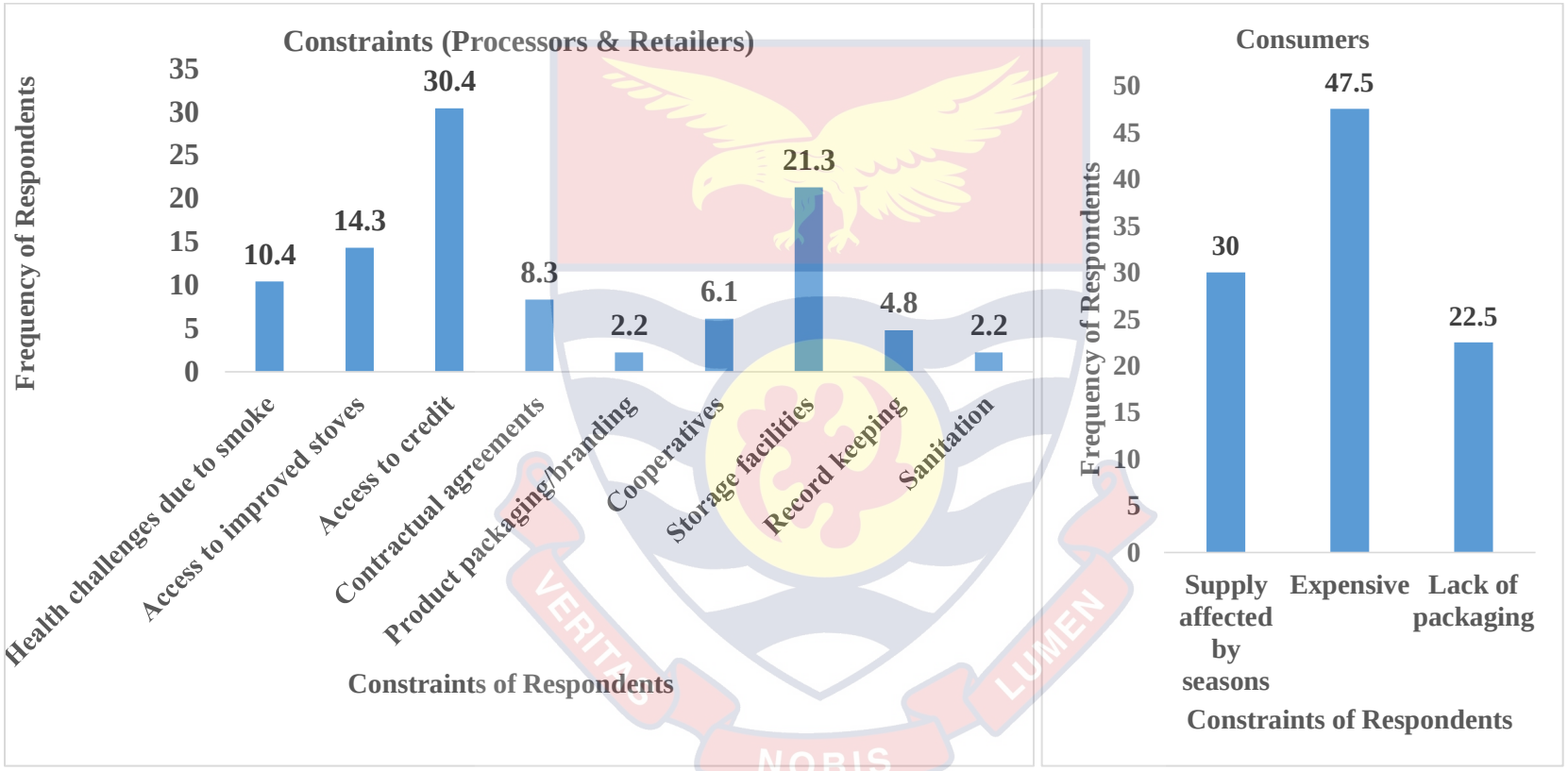


***Figure 24*: Relationship between net income from all species and the percentage proportion of income from croakers (Economic Reliance)**

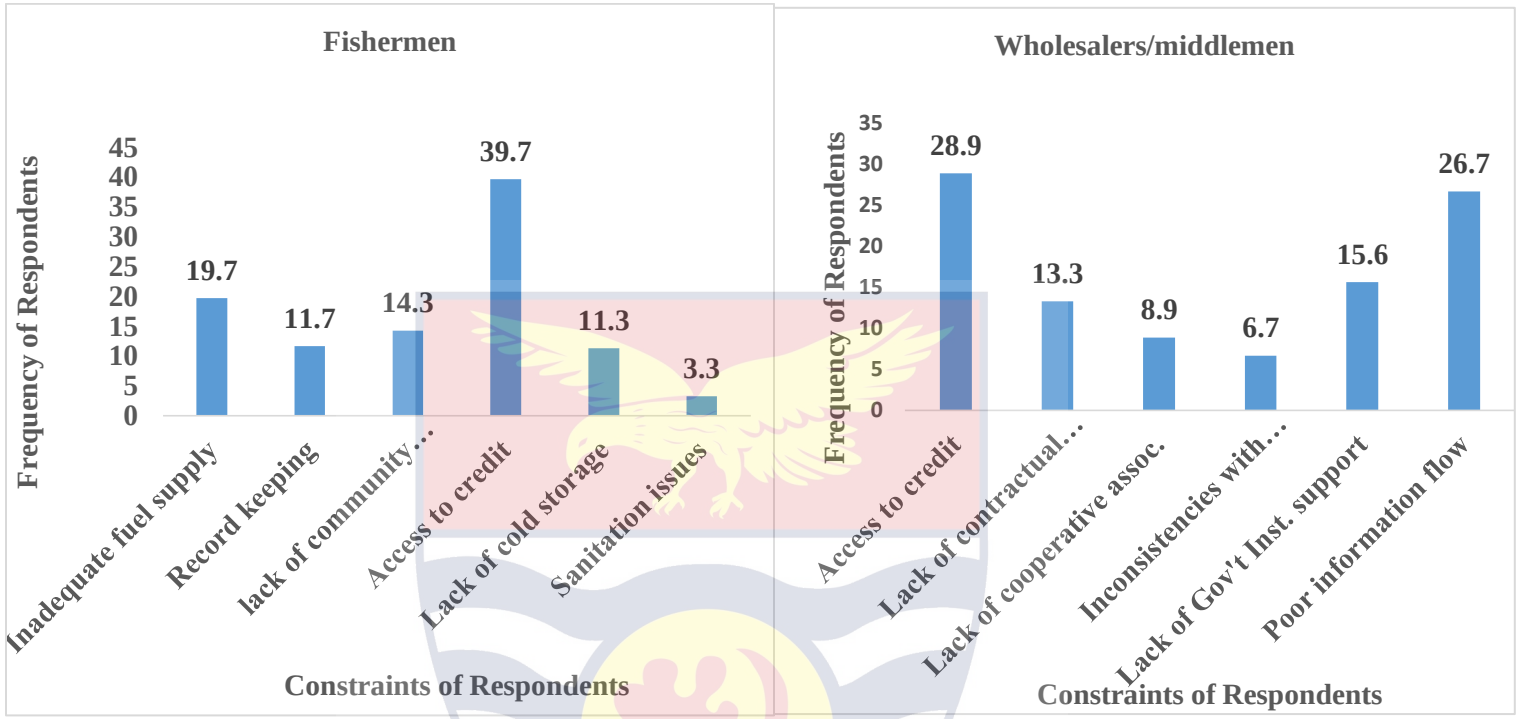
Figure 24 shows the average monthly net incomes of the croakers from all the sampling sites. The average net monthly income was predicted at Anlo Beach using the percentage proportion of income from croakers. There was a positive linear relationship between the net income and the income from the croakers which means that a change in the income of the croakers cause a change in the net income of the croakers. At Cape Coast, the net income was predicted using the percentage proportion of income from croakers. There was a positive linear relationship between the income from croakers and the net income, which means that a change in the income of the croakers causes a change in the net income. At Elmina, the graph showed a positive linear relationship with an R^2 value of 26%. This means that the croakers contribute a high percentage (between 55% and 88%) of the fishermen's total income. At Sekondi, there was a positive linear relationship between the two variables and an R^2 value of 15% was observed from the graph. It was also observed from the graph that the croakers contribute above 55% of the average monthly net income of the fishermen.

CONSTRAINTS AND OPPORTUNITIES IN THE CROAKER BUSINESS



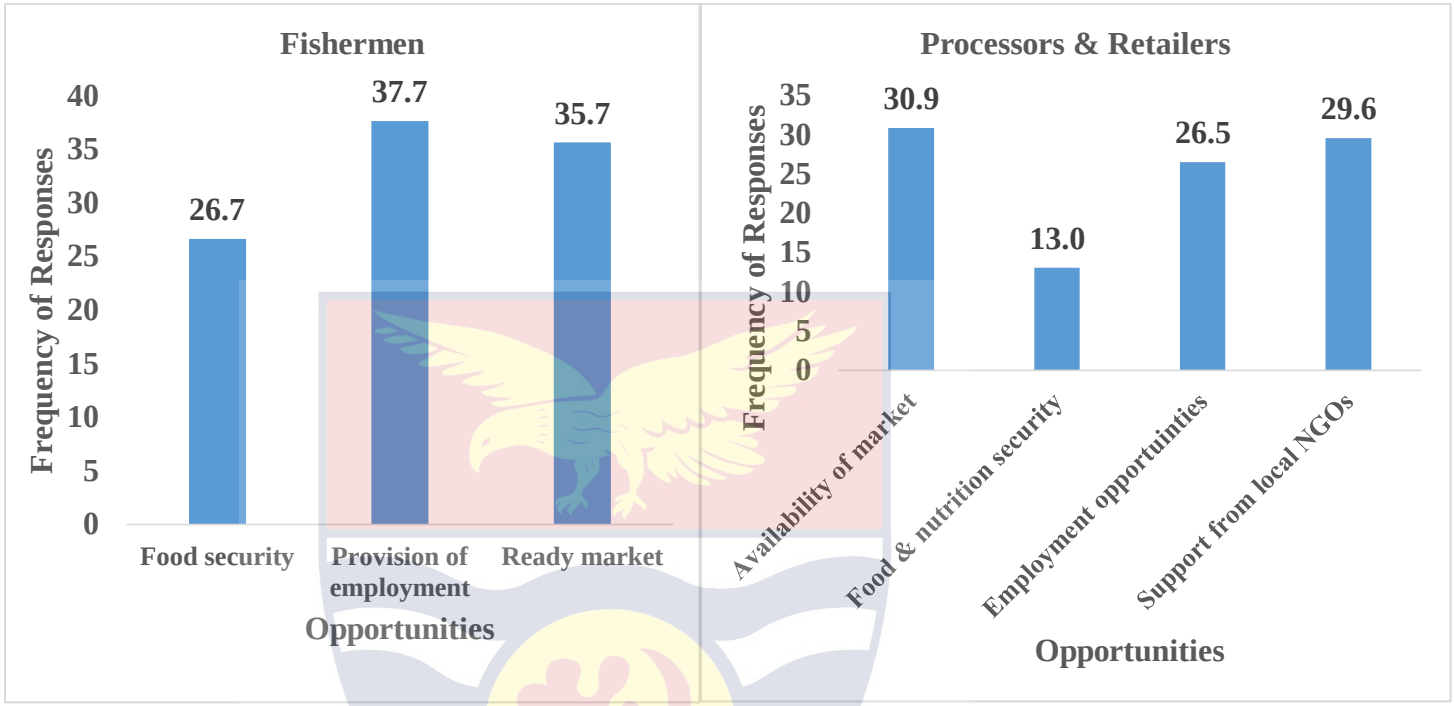
N = 230 Mean = 4.18, Std. Dev, = 2.302 N = 45 Mean = 3.47, Std. Dev. = 2.036

***Figure 25*: Constraints in the Croaker Fishery among processors & retailers and consumers**



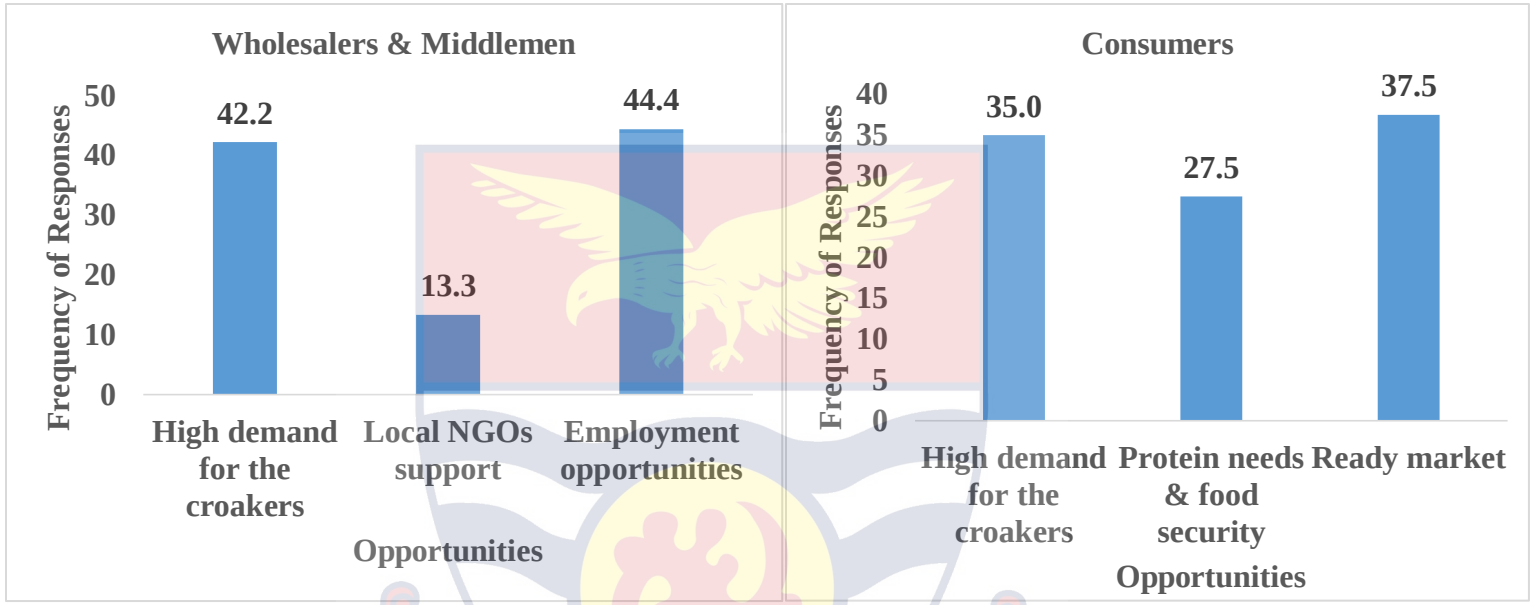
N = 300 Mean = 3.21, Std. Dev. = 1.419 N = 40 Mean = 1.92, Std. Dev. = .73

***Figure 26*: Constraints and in the Croaker Fishery among fishermen and consumers**



N = 300 Mean = 2.09 Std. Dev. = .786 N = 230 Mean = 2.55 Std. Dev. = 1.209

***Figure* 27: Opportunities in the croaker business among fishermen and processors**



N = 45 Mean = 2.02 Std. Dev. = .941

N = 40 Mean = 2.03 Std Dev. = .862

***Figure* 28: Opportunities in the croaker business among wholesalers and consumers**

Constraints and opportunities of the respondents (fishermen, processors and retailers, wholesalers/middlemen and consumers) were analyzed along the value chain. There were three main areas of focus for upgrade. These were at the micro level which involved improving the overall efficiency on the value chains (product and process upgrades), the meso level which involved an assessment of the constraints between the chain operators and the facilitating services and the macro level which involved the assessment of the relationship between value chain operators and the enabling environment. The constraints were summarized and presented in Figure 25 and Figure 26 while opportunities were presented in Figure 27 and Figure 28.

***Figure 29*: Local Support Partners on the Croaker Fishery Value Chain**

Figure 29 shows the croaker fishery value chain support partners. These include local and foreign NGOs who provide various forms of support services to the croaker fishery business, sources of the market information available within the communities, community banks providing credit services on the value chain, governmental policies surrounding the croaker fishery as well as the extension services provided on the chain, mainly by MOFAD/FC.

Chapter Summary

The findings of the analysis were presented in Chapter Four. The value of the croakers at the landing sites and value due to processing were established. The profitability of the croaker fishery along the value chain were assessed. Factors that influence pricing and equity; and consumers' willingness to purchase the croakers were analysed. The level of economic reliance on croakers by fishermen was also assessed and an evaluation into the constraints and opportunities in the croaker fishery projected.

CHAPTER FIVE

DISCUSSION

This Chapter covers a discussion on the economic value of croakers at the landing sites and the resulting economic value due to processing. It also discusses the profitability of croaker fishery along the value chain, and analyses factors that influence pricing and equity; as well as contextual factors that influence the purchase of croakers. The section also discusses the extent of the economic reliance on croakers by fishermen and discusses the constraints and opportunities in the croaker fishery along the value.

Economic Value of Croakers at the Landing Sites and Value due to Processing

Value addition measures the accumulation of wealth and the production process's contribution to economic growth (Porter, 1985; FAO, 2014). Value addition is the value that every agent contributes to the value of inputs during the accounting phase of the production process at each point of the value chain. At the landing sites, the value of the croakers varied. Anlo Beach had the least value of $2.40/kg among the study sites. The low price recorded at Anlo Beach could probably be attributed to the fact that it is a rural community, and for most rural communities, the pricing of natural resources are relatively low. The canoe and paddle system of fishing was used, which meant that no fuel was used, and so lower expenditure rates were recorded. This could probably account for the low pricing recorded. Subsequently, Anlo Beach recorded the least average monthly operational cost of $ 910.40 and the least income from the croakers ($ 2392.01)

among the four communities (Table 11). The fishermen were engaged in other jobs like farming, riverine fishing, and trading during the lean fishing season, which appreciated the incomes by an average of $ 9.40 per person per month. According to De Silva, (2011), small-scale fishermen worldwide are the victims of business ignorance, while the winners of high-profit margins are intermediaries and traders. Findings from the current study indicated that the fishermen sold the croakers at relatively lower prices than the rest of the actors along the value chain.

Jacinto (2004) also points out that under-pricing of fishery goods in both domestic and international markets is a geopolitical issue that needs significant consideration. Further, as long as externalities occur in the value chain, the final market costs, whether domestically or globally, do not reflect the true cost of producing the fish products. From the current study, prices of the croakers increased as the product was sold by the fishermen at the shore, and as value was added to it. Jacinto (2004) further noted that the pricing method ignores social and environmental costs, making what is costly inexpensive. However, in this work, no such deductions relating to the environmental costs were made before pricing was arrived at from the shores. Yamashita (1996) also argued that several varying factors affect the price of fish on the market. Among them are the assessment of freshness and efficiency, domestic price differentials, monopsony, storable and non-storable goods, methodological adequacy and price differentials between manufacturing and retail. The market price is thus known to be formulated based on these different factors. This, however, was not the case in the pricing of the croakers in the current study. The pricing encountered were fixed, self-determined

by the croaker fishermen (for large-sized croakers) and bargaining from buyers. De Silva, (2011) indicates that buying and selling are normally done from the boats and canoe as soon as it is landed directly to customers and this does not give a clear example of how the pricing of fish at the shore is carried out. In the current study, pricing was arrived at through bargaining in most cases and this was similar to the findings of De Silva (2011). Subsequently, 48.3 % of croaker fishermen responded that they self-determine the prices whiles 32.3 % said pricing was arrived at through bargaining. The rest (19.4 %) said they follow the fixed pricing method. Cape Coast had the highest estimated value of $ 3.00/kg.

According to ATFALCO (2012), in most parts of Africa, processors purchase fish from fish traders, but there are cases in which they buy directly from the fishermen as well. Processors travel to other landing sites to buy fish where there is an inadequate supply of fish. In the current study, processors rather bought their fish directly from the fishermen at the shore, and often complained of higher prices from the croaker fish traders. Croaker fish processors and traders travelled to other landing sites to buy the croakers as and when it was available. Sekondi and Elmina recorded the same values of $ 2.70/kg and by this Anlo Beach recorded the least price per kilogram ($ 2.40) from the croakers. At the beaches, value addition was done in the form of sorting, grading, washing, cleaning and aggregation of the fish. Muluken (2014) indicates that the simplest value addition methods were washing, grading, bulking, and storage. Those practices were visible in this research and were conducted by the crew.

Elmina landing quay is a home for both the artisanal and semi-industrial fleets and buyers from all over Ghana and beyond purchased fish from this quay. Comparatively, a Kilogram of the croakers at Elmina was slightly cheaper ($ 2.70) than in Cape Coast ($ 3.00). The croakers were highly patronized at Elmina. Sekondi has one of the largest landing quays in Ghana for artisanal, semi-industrial (inshore) and industrial vessels. It is also one of the largest fish markets in Ghana. It was observed from the current study that fish traders across West Africa patronized fish trading at Sekondi. The processors were the main causality of change of the fresh fish to other forms through value addition. They used simple equipment such as basins, knives, trays, buckets, chopping boards and ovens. They also used fuelwood and coconut husks for making fire. The processing sites were close to the beaches, so goods were carried by the head porters, small trucks, and tricycles. Among the processing methods encountered were smoking, frying, salting, filleting and cold storage. Smoking was the most widely practiced method in Ghana (Dovlo et al. 2016; Kegan, 2001). According to Nutz & Sievers (2015), value addition refers to how small businesses create more wealth in the local economy, generating more employment and greater incomes.

At Anlo Beach, the value addition of the various processing methods per Kg was assessed. Smoking attracted a value added price of $ 0.30, and this was mainly the cost of fuelwood with any other cost while salting had a value added cost of $ 0.14 and this was the cost of salt with any other cost incurred during processing. Value added to the fried fish was $ 0.36, and this was the cost of

fuelwood, oil, and salt. Fresh fish attracted a value added cost of $ 0.36, which was the cost of freezing (Table 4). At Cape Coast, frying attracted the highest value added cost of $ 0.80 per Kg weight of the croakers. This was followed by smoking with an average cost of $ 0.60, representing fuel cost, with all other costs. The least-cost was filleting, which attracted a value added cost of $0.20, being the cost of filleting tools and other costs (Table 4). At Elmina, both frying and fresh fish attracted the same cost of value addition of $ 0.36, which was followed by smoking ($ 0.30), salting ($ 0.20), and filleting ($ 0.13) (Table 4). At Sekondi, the highest cost of value added was seen with filleting ($ 0.60) followed by frying, which was $ 0.50. Both smoking and fresh croakers attracted the same value of $ 0.30 whiles salting went for $ 0.12 (Table 4).

De Silva (2011) indicated that post-harvest losses are as high as 30 to 40 percent of the harvest in developing country markets but quickly added that value addition tends to minimize post-harvest losses. The cost of croakers was relatively high, and the demand for it was even higher, and therefore by adding value to it through processing, losses were hardly visible. Dovlo et al. (2016) reported that 50% to 60.6% of fish processors prevent spoilage or reduce it by excellent smoking practices in smoked fish. In the Central region, between 12.5% and 17.3% of processors used ice to prevent spoilage in fresh fish, while in the Western Region, a total of 3% of processors preserved fish with ice. Also, about 78% to 83% of processors from the Western and Central regions respectively are engaged in the fish smoking business, according to Dovlo et al. (2016).

UNIDO (2009) indicates that the value chain draws on the premise that a commodity is rarely consumed in its raw form but is transformed, processed, packaged, transported, sold, etc., before it gets to its final consumer by the collective activities of multiple linkages. Value is, in this way, gradually added to the products. As indicated by CIAT (2004), the next set of transactions involved after the value addition is the fishery products' movement from the processors to the consumers through intermediaries.

The Value Chain Market Map

Market access is considered a significant indicator of the value chain. A well-functioning value chain has to enable market access to its stakeholders. Figure 19 depicts the structure of the market channels of the croakers. At the input stage, fishermen prepare for fishing by acquiring aids such as fuel, different kinds of gears, ice, bulbs, floats etc. Two kinds of fishing methods were encountered. These were the artisanal and the semi-industrial types. At the shore, buyers could buy directly from the fishermen. The processors processed their fish on either small scale or on large scale based on the resources available. The middlemen either bought from the fishermen and sold to customers or mediate to sponsor fishing trips for processors. The wholesalers bought from the fishermen, cold freeze, and sold to buyers mostly in large quantities, ending up with the rural, the peri-urban or urban consumers, hospitality industries, the supermarkets and many other outlets. The large scale wholesalers also sold to foreign individuals who were known to export the products to international markets. These were identified to be mainly China. The consumer marketing centres were the rural markets,

vendors, and open markets. The retailers retailed croakers throughout all the important market centres in Ghana. The distances from the shores to the townships or community markets were relatively close. Road-transport was often used to reach the marketing centres utilizing taxi cabs and passenger vehicles (Nunoo et al. 2015). Passenger vehicles were relatively cheaper than hired vehicles and were readily available. Local buyers were encountered all over the country from places such as Axim, Agona Nkwanta, Prestea, Tarkwa, Takoradi, Shama, Beposo, Mankessim, Assin, Fumso, Obuasi, Kumasi, Techiman, Sunyani, Accra, Tema, Koforidua, and Tamale. The fish were also transported and sold within in the West African sub-region, to countries like -Togo, Benin, Cote d'Ivoire and, Burkina Faso. The map also shows the support services provided for the value chain operators by the enabling environment (Figure 19).

The Profitability of Croaker Fishery along the Value Chain

Keynes (2013) contends that profit is the driving force behind the growth of business ventures and that each business company should gain adequate profits to support and expand it over the long term. The benefit is the surplus sales for a given time over the corresponding cost of production. On the other hand, profitability is the potential of investment to gain returns (Tulsian, 2014).

As shown in Table 5, the input-output structure of the various processing methods at Anlo Beach is not uniform. Though salting recorded the least input, it had a relatively high net income of $ 1.86/Kg, with frying recording the highest net income of $1.88/Kg though with a high cost of the input ($ 0.36/Kg). This probably shows that salted fish was the preference of most people for stews and

soups, so it was bestselling. Processors at Anlo Beach made higher profit margins than the retailers. This was because the retailers incurred higher expenditure than the processors, and besides, the processors mostly sold the products to foreign buyers while the retailers traded at surrounding markets. Comparatively, Anlo Beach made slightly lower net incomes than the rest of the communities. Processors possibly bought the croakers at lower prices but sold them at relatively higher prices to the consumers from the urban centres, making higher profit margins. According to La Vina (2002), there are advantages for traders, primarily in increased sales. If the product moves from one level to another, more value was added, and so much return was anticipated, yet this was not the case at Anlo Beach since most of the processors sold to foreign buyers and so made much profit. The local retailers traded in surrounding communities. Macfadyen et al. (2003) also indicate that trading directly and through multiplier effect increase jobs and revenue generation. For this reason, the processors generated much profit as they worked with family and friends, and distributed the products to consumers.

At Cape Coast, the net income from the various forms of processing showed a variation from the retail incomes (Table 5). Filleting attracted a net income of $ 3.47/Kg from the processors, while the net income for retail was $ 1.70/Kg. Similarly, smoking attracted $ 2.67/Kg net producer income while the retail income was $1.80/Kg. The least cost of input and returns was salting for both the processors ($1.65) and retailers ($ 1.60). In Cape Coast, the processors made higher net incomes than the retailers in most cases, though the retailers did

not run at losses. This could mean that most customers purchased directly from the processors since they worked from their processing gates. According to ATLAFCO (2012), it is unusual for processors to travel across the nation to market their fish because most retailers do all the travel. This is consistent with the current research findings where the processors had traders from all over the country and beyond, approaching them for trade purposes.

At Elmina (Table 5), filleting recorded the highest net incomes for both the processors and retailers, $ 2.52 and $ 6.00, respectively. Retailers made much profit on this product. This could also be because filleting is the preference of most hospitality industries around the community and for most buyers. Smoking attracted the least income for both the processor ($ 1.84) and the retailer ($ 2.00). The net income from filleting at Sekondi (Table 5) was higher than the other processing methods. The processor made a net income of $ 12.75 whiles a retailer made a profit of $ 5.00. Salting attracted the least net income from both the processors and the retailers. A wholesaler made a net income of $ 1.87/Kg whiles a retailer made $ 1.40 for the same quantity. From the profitability analysis (Table 6), the highest percentage of profitability was from filleting (79%) and salting (63%), both at Sekondi. The least was smoking at Anlo Beach (36%).

ROI is a key performance indicator (KPI) that is often used to determine the profitability of expenditure due to its exceptional usefulness for measuring a business's success and making future business decisions. This was presented in Table 7. The highest profit margins and ROI margins were encountered from the processors, followed by the retailers and then the wholesalers/middlemen, and

lastly, the fishermen. Most of the processors preferred to sell their products from their processing gates to maximize profit. Per the profit margin analysis, the fishermen received the least price per Kg of the croakers on the chain. Liang et al. (2010) noted that producers hardly receive a reasonable share of profits considering the risk they shoulder, which is due to weak bargaining power. This was evident in the current study. Sekondi recorded over 100% return per dollar invested in the croakers' processed products in the area. This, together with all the other values, showed that the croaker business brings a high return on investments. De Silva (2011), conducted a study on species in Ghanaian waters and concluded that important demersal fish are targeted to, and enjoyed by the wealthiest. For this reason, consumers of croakers probably chose the taste over the price. In the current study, processors confirmed that they had buyers from within the West African countries.

The annual NPVs at the study sites were plotted and compared to the ROI to determine the croaker fishery's profitability and the break-even point, (the point in which the volume of sales will result in no net income nor net loss on the actors' income) to ascertain the return on investment year. The NPV was based on three study assumptions: that the

1. Initial investment costs are the same
2. Depreciation over time assuming no further injection of capital
3. ROI is NPV at which the discount factor (df/dr) is 0 determines the ROI

These were used in the discussion of the NPV.

The NPVs are presented in Figure 20, Figure 21, Figure 22, and Figure 23. At Sekondi, all the value chain actors were compared. The processors recorded the highest annual NPV value of $ 135,331.00 on the processed products with ROI at year 17, being the break-even year. The retailers recorded an annual NPV value of $ 69,292.00 and ROI in year 28, and the wholesalers with an annual NPV of $ 48,170.00 and ROI also in year 28. The fishermen recorded an annual NPV of 35,154.00 and an ROI year at 29. Comparatively, the processing business recorded an earlier break-even year than all the other fishery businesses. It was, therefore, the best ROI and is considered viable among the four fishery businesses at Sekondi. This was followed by the retailers and wholesalers, and then the fishermen (Table 8). At Elmina, the retailers recorded an annual NPV of $ 96,979.00 and an ROI year at 25. The processors also made an annual NPV of 43,326.00 with an ROI year at 17. The wholesalers recorded an annual NPV value of 35,882.00 and ROI at year 27, whiles the fishermen recorded an annual NPV of $ 35,088.35 with ROI year at 28 (Figures 20, 21, 22, 23). This makes the processing business preferred along the chain since it breaks even earlier than the rest. The next preferred is the retail business, with the least preferred being the wholesalers (Table 8).

At Cape Coast, the annual NPV for the processors was $ 61,580.32, with an ROI at year 17. The wholesalers had an annual NPV of $ 40,033.00 with an ROI year of 26. The retailers also recorded an annual NPV of $ 43,928.00, with ROI year at 24, whiles the fishermen recorded an annual NPV of $ 20,283.06 with ROI at year 27 (Figures 20, 21, 22, 23). Table 8 shows that the most profitable

business with the least number of years for the ROI is the croaker processors, followed by the retail and wholesale businesses and then the fishermen. Anlo Beach recorded an annual NPV of $ 28,418.00 among the processors with an ROI year at 17, while retailers made an annual NPV of $ 20,701.00 with an ROI at 25. The wholesalers recorded an annual NPV of $ 28,051.00 and an ROI of 27. The fishermen had an annual NPV of $ 20,283.06 and ROI in year 27 (Figures 20, 21, 22, 23). This makes the processing business at Anlo Beach the most profitable to invest in, followed by the retail, fishing and wholesale businesses. The ROI on the wholesale business lasted much longer (Table 8).

The percentage profitability was linked to the value chain governance along the croaker value chain. The understanding of governance contributes to identifying how the control and coordination systems on the chain work (Gereffi and Fernandez-Stark, 2011), where some players exert greater authority in the chain than others do. Irawati et al. (2009) also wrote about the importance of value chain governance analysis, mentioning that the absence of governance in a value chain results in issues of unequal allocation of gains between actors and an unfair value added distribution as uncovering issues of chain coordination. From the profitability analysis; the processors dominated the current study. This was because processors formed the largest buying group of the fish and played a major role in price determination due to their bargaining skills to arrive at the commodity exchange. The processors were noted to sponsor fishing trips and, in this way, control pricing during landings. The processors often disseminate fish landing and pricing information to other processors within and from other

communities. They were also engaged in value addition and supply along the chain to the consumers and often recorded the highest profit.

Analytically, several studies have been documented on value chain governance types by different researchers (Humphrey & Schmitz, 2002; Gereffi, 2005; Ponte, 2008; Sturgeon et al. 2008) due to the unique attributes in the prevailing governance types on the value chain. The relational governance has characteristics such as transfer of information based on mutual reliance as also supported by De Silva (2011), social and spatial proximity between buyers which was prominent within the communities, family ties within the communities in that entry into the business was based on either trust/relationship or learning through the family tradition. Another attribute was the presence of a lead firm along the chain which was identified as the croaker processors, who were noted to exert power on the chain and thus have control over the other actors. Less codification was also an attribute in relational governance, and this was consistent along the chain. Within the communities, relationships between the buyers and seller have been built over the years, and also value chain actors had regular buyers. These were evident in the structure along the value chain in this study to arrive at the governance type being relational.

Factors that influence Pricing and Equity

There were several ways through which the fishermen sold their products. According to Jacinto (2004), pricing data can be accessed from different outlets, such as often available government records and market organisations, which are supposed to provide timely and accurate statistics on which business decisions

can be based, as well as academic and research institutions. Yet, there was limited or unavailable data on pricing information to support the current study. From the analysis, the experience (number of years in fishing) of fishermen increased pricing slightly, though not statistically significant (Table 9). From the field survey, fishermen quoted their prices but purchase was arrived at through bargaining. The bargaining power of both the fishermen and the buyers were also noted by Peterson, (2007) and Alapan et al. (2016), who wrote that the unit price of a given commodity or other traded item, such as labour or liquid financial assets, varies in a dynamic market until it reaches a point where the demand for the quantity (at the current price) is equal to the availability of the quantity (at the current price), resulting in an economic balance between the price and the quantity transacted. It was observed in this study that pricing was often determined by both buyers and sellers. Mayers and Vermeulen (2002) indicate that it is ideal for producers to negotiate directly with businesses available by community-company collaborations to economic partnerships to achieve maximum returns. However, this was not the case at the landing beaches since fish was bought by intermediaries before reaching the final consumers.

The artisanal croaker fisherman experienced a price fall of 13.1%, which was statistically significant at five percent, indicating the relevance of such variation. This implies that the type of fishing has a significant influence on the fish's price such that artisanal fishing type is relatively cheaper compared to the semi-industrial type of croaker fish. This was also evident at Anlo Beach, where the lowest pricing per Kilogram of the croakers among the research sites was

encountered ($ 2.40/Kg). Jacinto (2004), indicates that distributional effects are often distorted for the benefit of intermediaries along the chain.

The Consumers' willingness to purchase Croakers

Fish is regarded in all regions of the country as the most significant form of animal protein (Anon, 2003). An attempt was made to understand what influences consumers in the purchase of the croakers. The results of the factors affecting the consumption of croakers (Table 10) indicate an increased quantity of purchase by 43.7% with every unit of increase in consumers' salary. This has been supported by different researchers who have argued out that fish intake, frequency, and tastes are influenced by consumers' regional, socioeconomic, and cultural characteristics (Burger et al. 1999; Pieniak et al. 2011). For example on social events, the fishermen at Anlo Beach indicated that:

Croakers are often reserved (not commonly sold) during social events like marriages, parties, and funeral ceremonies at Anlo beach.

Many sensory characteristics such as taste, smell, and texture also influence food tastes etc. (Honkanen et al. 2005). From the quantitative analysis, all the respondents (100%) said they preferred the croakers due to the taste. From the field survey, the majority of sampled consumers preferred fried croaker fish (52.5%) followed by the fresh (27.5%) and then the smoked (20.0%). The survey revealed that rural consumers bought their croakers either from the shore, the open market, or from fish vendors within the communities. However, the urban dwellers bought their croakers from the supermarkets, hospitality industries, and the open market. Namisi (2005) indicates that the major factors affecting fish

consumption could include fish quality, location, and market prices for consumers. Proximity to the shore and processing sites could also be factors for local patronage of the croakers within the communities. Again, self-employed persons had a slight increase (18.1%) in the fish's consumption compared to the social workers. This is consistent with Namisi (2005), who wrote that the level of trade is influenced by the economic status, and buying power of customers.

Consumers were willing to pay for the croakers per Kg from the fishermen as opposed to the bargaining method which currently prevails at the shores. A total of 77.5% of consumers agreed to willingness to pay for the croakers in standard quantities and not through bargaining.

Level of Economic Reliance on Croakers by Fishermen

The level of economic reliance on the croakers was evaluated using the percentage proportion of income from the croakers and the monthly net incomes from all the fisheries products in each of the research sites. The results showed that income from the croakers formed a higher percentage of the fishermen's incomes, meaning a significant economic reliance of fishermen on the fishery. At Anlo Beach (Figure 24), there was a positive linear relationship between the net income and the income from the croakers, which showed a dependence of the net income on the croakers' income. Also from Table 11, the croakers contributed 61.02% of the net income of the fishermen. Comparatively, the incomes from croakers were higher than the income from other species of fish harvested. Sylla (2017) indicates that the croakers are abundant in the West African waters and are also in high demand across the region. At Cape Coast, the percentage proportion

of income from croakers was predicted against the net income. The equation of the line was positive, with an R^2 value of 43% and a positive linear relationship (Figure 24). From Table 11, the percentage contribution of the income from the croakers was 62.33% of the net income of the fishermen. This means an increase in the income of croakers increases the net income from fisheries. Income from croakers was also higher than that of the other species harvested. Nunoo et al. (2009) indicate that the croakers form up to approximately 70 percent weight of the total stock of scaenids and are the most economically valuable demersal fish in West African waters. In the current study, the croakers were noted to dominate the quantities of the harvested demersals and the incomes generated.

At Elmina, the percentage proportion of income from the croakers shows that the croakers contributed about 61.48% of fishermen's net income (Table 11). The graph shows a positive linear relationship with an R^2 value of 26% (Figure 24). This means that the croakers account for a high percentage of the fishermen's total income. Income from the croakers was also higher than that of the other species, which shows that the croakers have been harvested extensively by croaker fishermen. Several authors have written that the croakers are an abundant and commercially important fish (Gbaguidi, 2000, 2001; Sossoukpe, 2011; Sossoukpe et al. 2013), and this was observed in the current findings. The percentage proportion of income from croakers was predicted against fishermen's net income at Sekondi as shown in Figure 24. From Table 11, the croakers contributed 63.14% of the fishermen's net income. There was a positive linear relation and an R^2 value of 15%. In a related trawl survey in Ghana, Cassava fish

was noted to be harvested in larger quantities (Antwi-Asare & Abbey, 2011), which aligns with the current findings. According to FAO (2008), *P. senegalensis* recorded 9-10 percent of the 40 species landed by demersal trawlers in Côte d'Ivoire, and it is also an economically important species in the West African sub-region.

The impact of the income from the croakers could also mean that the croakers are over exploited and so are under stressed.

Constraints and Opportunities in the Croaker Fishery

Value chain analysis essentially aims at identifying constraints and opportunities; in this way, places where improvements are required are seen via the conduct of field studies and comparison of diverging expectations and outcomes. This is to assist influence the respondents' overall success on the chain, thereby showing places where improvement is required (CRFM, 2014). It comprises changes at the micro level, meso level and macro level. Thus, process product and functional upgrades.

The responses from the study sites identified different constraints (Figure 25 & 26). Among the fishermen's complaints were inadequate fuel supply, lack of record-keeping, lack of community cooperatives, access to credit, lack of cold storage, and sanitation issues. The results in Figure 26 showed that there were few variations observed. The highest constraint among the fishermen was access to credit, forming 39.7%. This was followed by an inadequate supply of fuel, forming 19.7%. The frequent shortages in fuel contributed directly to high demand for the croakers and low productivity anytime it

occurred, and this affected the whole production system and linkages directly on the value chain. This made the croakers' prices higher than normal yet; it is often not a unique case in Ghana among fishermen. The least variation among the constraints was the lack of cold storage, forming 11.3%. FAO (2004) notes that the absence of capital for investments in improved technology, inadequate post-harvest infrastructure, especially the absence of cold chains, does not essentially improve decision-making on fishery products. Availability of these pressing needs help the fishermen make good decisions with their pricing. Consequently, this affected their pricing since they always had to sell immediately after landing to prevent deterioration. Poor sanitation formed 3.3% of the responses.

The results in Figure 25 showed the constraints of processor responses. The highest responses forming 30.4% was on access to credit. This was followed by 21.3% responses on lack of storage facilities/spaces to keep their fish. Also, there were variations in access to improved stoves forming 14.3%, followed by health challenges due to excess smoke, which formed 10.4%. In relation to this, Asiedu et al. (2018) noted that because high levels of polycyclic aromatic hydrocarbons (PAHs) have also been found in smoked fish products, it is vital to examine trends in the smoked fishery sector of Ghana to ensure fish food safety for nutritional requirements. Owusu et al. (2019) also noted that there are health concerns for both processors and consumers of smoked fish in Ghana due to the traditional oven usage, and these health challenges include frequent coughs and nasal congestions, eye problems, and headaches.

Technologically, different stoves have evolved and have been used over the years concerning protecting human health (SFMP, 2015), to reduce fuel consumption and improve the quality of smoked fish (Kwarteng et al. 2016; Odjidja, Yeboah, Abgekpornu, Manu, & Beran, 2016). However, the current study noted that most of the processors still use the Chorkor stoves/ovens, though they know of the emerging Ahotor ovens (Avega & Tibu, 2017). The Ahotor ovens have been recommended for fish processors and are known to be environmentally hygienic (Avega & Tibu, 2017). Accordingly, 14.3% of the respondents responded that the business's greatest hindrance is the lack of improved ovens. With the Ahotor ovens, Kwarteng et al. (2016) indicate a cooler air chamber in the combustion chamber that prevents the production of elevated amounts of PAHs in smoked fish. FAO (2004) also notes that fisheries are increasingly influenced by compliance with food safety and quality assurance schemes, such as Hazard Analysis and Critical Control Points (HACCP) services. Good smoking practices with the use of the right ovens whiles observing standard protocols could assist processors meet internationally acceptable requirements of smoked fish, and this could increase the volumes of sales, and the foreign exchange earnings from fisheries. The croaker fishery products could then be moved to the global value chain trade level. Some of the benefits of smoking fish include enhanced flavour, reduced waste, and longer shelf life (Gordon et al. 2011). According to Owusu et al. (2019), in Ghana, more than 33,000 women fish processors use conventional methods to process fish for consumption and storage. The rest of the constraints were uniformly distributed

Figure 26 shows that with the responses to the wholesalers' constraints, access to credit ranked the highest, forming 28.9%. This was followed by a lack of information flow along the chain, forming 26.7%. The least variation was constraint with governmental institutional support in the croaker business. On the financial constraints, a triangulation was done with the local community banks, and the main response was that most of the actors lacked documented collaterals and guarantors to assist them in loan acquisitions, coupled with poor saving habits along the chain made access to loans very difficult. Information flow along the chain was also poor, as that was the duty of the actors themselves. The results from Figure 25 shows the constraints of the consumer responses. The highest constraint among the consumers was that the croakers were expensive, and this formed 47.5%. This was followed by the fact that the harvest was seasonal and not available all year round, which formed 30%, whiles there were 22.5% responses on lack of product packaging, which affects the finished product. With reference to packaging, De Silva (2011) agrees that the storage and shelf life of goods are enhanced by decent packaging materials and directly impart consumer preferences. Packaging and branding add value to the finished product and widens the sales outlets of the products. Hard sheets and plastic bags were used in wrapping the fish, as was observed in this study.

Other constraints encountered along the chain were lack of contracts between buyers and sellers, forming 13.3% of the wholesalers' responses and 8.3% of processors and retailers' responses. Much priority was placed on trust. Burch, & Maes (2017), however emphasized, a relationship of trust can be built if

business owners, members, and managers have an opportunity to meet often and discuss with their colleagues and network events to offer much scope for building useful contacts and exchanging ideas and news related to the industry and other sectors. Record keeping was also either limited or non-existent. This made it difficult to refer to previous happenings in the croaker fishing business and for comparative studies. In this study, 11.7% of the fishermen and 4.8% of the processors and retailers believed this was a hindrance to the croaker business's progress. Apart from the main *Ghana Canoe Fishermen Associations*, some of the fishermen, forming 14.3% responses, were of the view that lack of community cooperatives affects the fishing business. They cited misunderstanding among members and lack of trust as leading to the collapse of previous cooperative associations. This was supported by 8.9% of wholesalers and 6.1% of processors and retailers. As noted by Ribot (1997), lack of accountability to the members could essentially affect the quality of the associations. For access to new markets and technology, knowledge exchange, accelerating goods to markets, maximizing overall efficiency, and minimizing costs, associations, or networks are critical. A company or a person who joins an organisation is attempting to transcend its limits, according to Harrigan (1986). FAO (2004) also notes that a vast number of small-scale fishermen already work alone at the community level and are not associated with any organisation, and that weakens their socio-economic status and affects the success of fisheries as an economic field. In this survey, the lack of associations was noted to affect the pricing. One of the fishermen asserted that:

I quote my price with the aggregated croakers and the large-sized ones, but the purchase decision is arrived at through bargaining.

Ribot (1997) wrote that the creation of alliances helps establish external business ties and bargaining with prospective external buyers to be in a stronger negotiating role. The research revealed that the chain operators have weak linkages with the enabling environment. For instance, market information and information flow along the chain were poor. A total of 15.6% of the wholesalers and middlemen emphasized that the relationship between the value chain operators and the governmental institutions were abysmal. Apart from MOFAD/FC, there was very little knowledge of government institutions/agencies by the respondents.

Fishery services in Ghana have long been a backbone of the national economy, contributing significantly to its socio-economic growth and accounting for 60% of the animal protein consumed in Ghana (FAO, 2014). The fisheries industry produces over US$1 billion in sales per year, according to Bilijo (2014) and accounts for at least 4.5 percent of Ghana's Gross Domestic Product (GDP). Figures 27 and 28 in Chapter 4 present opportunities along the chain. All opportunities presented had means, which indicates that the responses are uniformly distributed. From Figure 27 in Chapter 4, the responses to employment opportunity were the highest among the fishermen in the croaker fishery. This formed 37.7% and was followed closely by the croakers' ready market, forming 35.7%. This is consistent with FAO (2014) report on fisheries, which states that the sector provides livelihoods for about 2.4 million

individuals in Ghana, including their dependents, who are directly or indirectly employed. Many people depend on fishing services for their livelihoods, including boat owners or canoe owners, fishermen, fish traders of all sorts for direct employment and supported employment. The least opportunity among the fishermen was food security, forming 26.7%. In line with Ghana Statistical Service (2008) report, on average, Ghanaians eat about 20-25 kg of fish annually, which is 13 kg higher than the world average. Also, approximately 75% of the overall fish supply is locally consumed (Bank of Ghana (BoG), 2008; FAO, 2014).

Figure 27 in Chapter 4 shows the opportunities among the croaker processors. The highest opportunity is the availability of market for the croakers, forming 30.9%. This is consistent with the report from Sylla (2017) that there is a high demand for the croakers across West Africa. It was closely followed by support from local NGOs, forming 29.6% and employment opportunity forming 26.5%. The least responses to the opportunity were food security forming, 13.0%. The processors enjoyed support services from NGOs such as CEWEFIA with training needs on proper handling of fish, lessons on a business plan, and the benefits of the Ahotor ovens. Hen Mpoano and SFMP also supported the actors in their jobs. Figure 28 shows that the highest responses among the wholesalers/middlemen were employment opportunities, which formed 44.4%. This was followed closely by high demand for the croakers forming 42.2%, and local NGO support forming 13.3%. NGOs such as Friends of the Nation, Hen Mpoano, SFMP USAID/UCC Fisheries Capacity Building Project programme

also supported the croaker fisheries value chain with capacity building training programmes which most of the actors benefitted from (Figure 29). In Figure 28 in Chapter 4, the croaker consumers' highest opportunity was access to a ready market, forming 37.5%. This was followed by high demand for the croakers, forming 35.0% and the least response being protein needs and food security (27.5%).

Chapter Summary

Chapter Five addressed all of the goals of the study. The basic functions of the value chain actors were obvious from the discussion. In Objective one, it was clear that there were different values for the croakers ($/Kg) at the study sites and different value addition forms attracting different costs. Objective two discussed the profitability of the various processing methods concerning the croaker fishery trade compared to the general fish trade in Ghana and around the world. It presented the ROI per every dollar invested and its projection into the number of break-even years for all the actors. The processing business had a break-even year (ROI) earlier than the rest of the methods. Objective three discussed the factors that influenced the pricing of the croakers and consumer preferences in the purchase of the croakers. It discussed factors such as the age of fishermen, type of fishing, the gender of buyers, operational cost, etc., of the croakers' purchase. Objective four discussed the contribution of the croaker income in the total income of the fishermen. It was observed that the croakers' income made higher percentage contributions (55% and above) to the total incomes of the fishermen

and was compared to the national data on croaker harvest and harvest in West Africa.

In objective five, the constraints facing the croaker fishermen and the opportunities were revealed. Some of the major constraints discussed among the fishermen were difficulty accessing credit, inadequate supply of fuel, lack of cold storage rooms, and sanitation issues. Among the processors, the challenges faced included access to finance, lack of storage facilities, access to improved stoves/ovens, and health challenges due to the excessive smoke. The wholesalers were constrained with finance, lack of information flow, and lack of governmental institutional support in the croaker business, whiles the consumers' constraints included the high cost of the croakers, seasonality affecting its availability, and lack of product packaging. Some of the opportunities included employment availability, a ready market for the croakers, support from local NGOs, the existence of financial institutions in the communities, and high demand for the croakers.

CHAPTER SIX

CONCLUSIONS

The croakers are essential fishery in the Central and Western Regions of Ghana that supports a thriving population. This analysis was undertaken to assess the economic importance of the croakers, and it involved a study that sought to establish the value chain of croakers in the Ghanaian fishery. The croaker fishery business provided an opportunity for market integration for fishermen, processors, retailers, wholesalers, middlemen and consumers. The survey revealed that the croakers had different values at the study sites, and value was added to the fishery at each stage of the chain. On the economic value of the croakers, it can be concluded that, lack of policy framework on pricing affects the value of the croaker fishery at the landing sites. Profitability analysis showed that processors made the highest profit along the chain. The fishermen were noted to make the least profit among the actors.

Per the Return on Investment (ROI), trading in Sekondi recorded the highest ROI values among the processors, which was up to $135,331.53. Retailers at Elmina recorded the highest ROI values up to $96,979.00. The Net Present Values were positive at all the study sites depicting the earnings generated were profitable. The Net Present Values also showed an early break-even year for all processors at the study sites and was concluded that the processing business was worth investing in. The governance structure per the analysis was relational, with the dominant actors as the processors.

Analyses of the fishermen's price and equity showed that the type of fishing and the operational cost significantly impacted pricing of the croakers. The fishermen's pricing method with the buyers had a significant influence on the price of the fish while with the consumers, women, through bargaining experienced significantly lower prices of the croakers than men, and also purchased more than the men.

The proportions of croaker fishery incomes to the TMI of fishermen revealed that the croakers contributed more than 55% of the TMI of the fishermen and is a major livelihood of the fishermen. It was concluded that challenges facing the croaker fishery had a negative influence on performance in the sector, and needs a serious attention to enhance the economic value of the fishery. Some of the significant challenges faced by the croaker fishery along the chain included difficulty in accessing credit along the value chain by all actors, inadequate supply of fuel, lack of cold storage rooms and sanitation issues, lack of storage facilities, access to improved stoves/ovens and health challenges due to the

excessive smoke. Opportunities in the croaker fishery included employment opportunities, a ready market for the croakers, support from local NGOs, the existence of financial institutions in the communities, and high demand for the croakers.

Recommendations

The following recommendations are made based on the findings of the study. On upgrading the chain, it is highly recommended that a standard measure for determining the croakers' value in terms of pricing is done among the fishermen to reverse the current system of sale through bargaining as was observed in objectives one and three. Also, for fishermen to increase their profit margins and bargaining power, the formation of cooperative associations are essential, and these could be facilitated by MOFAD/FC, local NGOs and supporting institutions.

Based on the findings and conclusions of the profitability analysis, it is recommended that challenges facing the croaker fishery processors be given much attention to improve upon the business since it proved to be the best business to invest in, along the chain as was observed in objective two. Good monitoring systems must be put in place by GSA, GEPC, EPA and all supporting agencies to enhance croaker fish smoking to meet the acceptable international standards of the global value chain fish trade to boost the earnings of the processors and increase the economic gains of the country.

On the findings and conclusions on the economic reliance on the croakers by the fishermen in objective four, it is imperative that MOFAD/FC,

governmental agencies and supporting NGOs in the fisheries industry work closely with the croaker fishery sector to support its development mostly through capacity building programmes such as on record keeping and avoiding fishing during the croaker spawning season.

On the constraints along the value chain in objective five, it is recommended that the Ministry of Fisheries and Aquaculture Development works closely with the MOTI, GRA, BoG, CEPS, etc. to control and note the quantities of croakers exported to the West African markets and the international markets to ensure maximum economic growth in the country. Infrastructure development at the landing sites, such as cold storage facilities, is also highly recommended. Development partners and the government agencies such as Ghana Ports and Harbours Authority should pay attention to building storage facilities along the coast to control excess catch. MOFAD/FC, FDA, GSA, FRI, EPA, supporting NGOs, Metropolitan, Municipal and District Assemblies (MMDAs), and interest groups should make it an utmost priority to address hygiene across the landing sites and the processing areas to ensure quality and safety in post-harvest handling. There must also be training programmes on the culture of saving with banks along the value chain to facilitate borrowing. Training on product packaging and branding is essential to enhance both local and international trade. Financially, organized fish traders could also benefit from loan schemes from the Export Development and Investment Fund (EDIF). Tackling these constraints could ensure evenness along the chain.

The Fisheries Act, 2002, and the 2014 amendments look at fish preservation and processing, yet the policy does not examine women's role and needs along the value chain. A careful look at the needs of the women (actors) could result in a significant policy action for all women actors along the value chain, and this could address most of the identified problems in the current study. Though the Act's focus was on capture fisheries, a needs assessment could reveal the challenges currently facing the fishermen in the sector. Also, MOFAD/FC should ensure the development of a database on fishermen, processors, and all other traders in the croaker fisheries industry (and the fisheries sector in general) to enhance informed decisions on gender roles in the fisheries sector and to make information available for future research work. More research on the croaker value chain is recommended to define best upgrading practices accepted by the various chain actors to assist the implementation of well-organized regional and national croaker fishery decisions. Further research on the exploitation level of the croakers is recommended.

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APPENDICES

APPENDIX A

Background characteristics of processor respondents

This Table provides information on the profile of sampled respondents concerning their age, sex, number of years in business and the types of processing they do.

Variable		Smoking (n=116)		Frying (n=25)		Salting/Drying (n=39)		Filleting (n=10)		Retailing (n=40)	
		F	%	F	%	F	%	F	%	F	%
Sex	Male (4.8%)	1	0.9	-	-	-	-	10	100		
	Female (95.2)	115	99.1	25	100	39	100	-	-	40	
Age (Years)	Below 21	3	-	3	11.5	-	-	-	-		
	21-30	42	3.9	13	50.0	5	16.1	-	-		
	31-40	53	21.6	6	23.1	8	25.8	5	45.5		
	41-50	78	4.2	4	15.4	10	32.3	6	54.5		
	51-60	39	30.4	-	-	7	22.6	-	-		
	Above	5	3.9	-	-	1	3.2	-	-		

	60									
No. of Years in business	Below 5	2	2.0	7	26.9	1	3.2	-	-	
	5-10	1	1.0	10	38.5	5	16.1	-	-	
	11-15	12	11.8	4	15.4	3	9.7	-	-	
	16-20	17	16.7	1	3.8	5	16.1	9	81.8	
	Above 20	70	68.6	4	15.4	17	54.8	2	18.2	

N = 230

APPENDIX B

Background characteristics of fisherman respondents

Background	Categories	Frequency	Percent (%)
Sex	Male	300	100
	Female	-	-
Age	Below 21	-	-
	21-30	1	0.3
	31-40	79	26.3
	41-50	139	46.3
	51-60	79	26.3
	Above 60	2	0.7
No. of Years	Below 5	3	1.0
in business	5-10	1	0.3
	11-15	7	2.3
	16-20	77	25.7
	Above 20	212	70.7

N = 300

APPENDIX C

INTERVIEW GUIDE

Input suppliers

Date:

Location:

Gender:

A. Socio-Demographic Characteristics of Respondents

1. Age

i. Below 21 yrs [ ] ii. 21-30 yrs [ ] iii. 31-40 yrs [ ] iv. 41-50 yrs [ ]

v. Above 50 yrs[ ]

2. Sex (i) M (ii) F

2. How long have you been involved in the fishing inputs supply business?

i. < 5 yrs [ ] (ii) 5-10 yrs [ ] (iii) 10-15 yrs [ ] (iv) 15-20 yrs [ ]

(v) above 20 yrs [ ]

B. Fisheries Input Supply

1. What kinds of products do you supply?

Fishing Input	Price	Sources (Local/Foreign), where?

Other specify……..

2. From the sources of purchase, do they give it to you on credit or outright payment?

   I. Credit [ ] ii. Outright payment [ ] iii. Both [ ]

3. Do you have employees?

   Yes [ ] No [ ]

No.	Male	Female

4. How does selling inputs benefit you and your household? ….....

   .....

   .....

   .....

   .....

5. About how much income do you make in a month from the following:

   i. Sale of fishing inputs? Amount in GHS……

6. What are your other sources of income?

   ii…… Amount in GHS……

ii…… Amount in GHS……

ii…… Amount in GHS……

7. What are your sources of credit/money used in doing business?

i. Self/partner [ ]

ii. Banks [ ]

iii. Susu/credit groups [ ]

iv. Friends and Families [ ]

v. others……

8. Are you a member of any supplier association?

If Yes please provide name and its function below

Name…….. Function……

Name…….. Function……

Name…….. Function……

If No move to Item 11.

11. Who are your competitors? .....

12. What are the challenges/constraints in your business?

i. ……..

ii. ……..

iii ……..

iv. ……..

13. In what ways do you think your business can be improved?

i. ……..

ii. ……..

Thank you!

APPENDIX D

INTERVIEW GUIDE

Fishermen (Boat/Canoe owners)

Fishermen

Date: Interviewee's name:

Location: Contact:

Gender:

A. Socio-Demographic Background of Respondents

1. How old are you?

(i) Below 21yrs (ii) 21-30yrs (ii) 31-40yrs (iii) 41-50yrs (iv) 51-60yrs

(v) above 60yrs

2. How long have you been involved in the fishing business?

(i) < 5yrs (ii) 5-10yrs (iii) 10-15yrs (iv) 15-20yrs (v) above 20yrs

3. **Catch Contribution**

Fishing Operation	**Artisanal**	**Semi-industrial**	**Industrial**

Operational cost per trip (fuel, maintenance (net mending/boat), ice, food)			
No. of trips per week			
Average catch per fishing (GH¢)			
Income on croakers harvested per week (Gh¢)			
Price per Kg of the croakers (GH¢)			
Quantity of trashed croakers (Kg/GH¢)			
Price per Kg of the trashed croakers(GH¢)			
About how much croakers do you consume per week			

4. How does this business benefit you and your household?

i.....

ii.....

iii.....

5. Do you have employees?

No.	Male	Female

Yes [ ] No [ ]

6. What is the daily wage per person for these employees? …….

7. About how much income do you make per week/ month from the following:

i. fishing activities? Amount in GHS……

8. What are your other sources of income?

ii…… Amount in GHS……per week [] / per month []

ii…… Amount in GHS……per week [] / per month []

ii…… Amount in GHS……per week [] / per month []

9. Where do your buyers come from?

i.....

ii.....

ii.....

10. Which of the following applies to the gender of your buyers?

Males [ ] Females [ ] Both [ ]

11. Do your buyers buy your fish on credit or outright payment?

i. Credit [ ] ii. Outright payment [ ] iii. Both [ ]

12. How do your suppliers of input give those inputs to you?

i. On credit [ ] ii. On outright payment [ ] iii. Both [ ]

13. What are your sources of credit/money used in doing business?

i. Self/partner [ ]

ii. Banks [ ]

iii. Susu/credit groups [ ]

iv. Friends and Families

v. Processors [ ]

Others……

14. Who determines the pricing of your fish?

    i. Self

    ii. Bargaining

    iii. Konkohema

    iv. Customers

    v. Sponsor

    vi. Fixed pricing

15. Between which months do you make the most sales?

    i……

16. What are the constraints and opportunities in your fishing business and can it be improved?

    i. ……

    ii. ……

    iii. ……,,,

    iv. ……

17. Do you know of any institutions/stakeholders that help you in your fishing activities?

If Yes please provide the name

Name……. Function…..……

Name……. Function…….……

Name……. Function……..…

No [ ]

18. Do you have/join any Fishermen association?

If Yes please provide name and its function below

Name……. Function……

Name……. Function……

Name……. Function……

NO [ ] Why……

Thank you!

APPENDIX E

INTERVIEW GUIDE

Processors

Date: Interviewee's name:

Location: Contact:

Gender:

A. Socio-Demographic Background of Respondents

1. How old are you?

(i) Below 21yrs (ii) 21-30yrs (ii) 31-40yrs (iii) 41-50yrs (iv) 51-60yrs

(v) above 60yrs

2. How long have you been involved in the fish processing business?

(i) < 5yrs (ii) 5-10yrs (iii) 10-15yrs (iv) 15-20yrs (v) above 20yrs

3. Do you have employees?

Yes [ ] No [ ]

No.	Male	Female

4. What are the duties of your employees?

……

……

……

5. What is the daily wage per person?

Amount in GHS……per week [] / per month []

Amount in GHS……per week [] / per month []

Amount in GHS……per week [] / per month []

6. Which of the following processing methods do you use?

I. Smoking [ ]

ii. Frying [ ]

iii. Salting and drying [ ]

iv. Drying [ ]

v. Filleting [ ]

7. How much is a kilogram/basin of fish? ……

8. What is the cost of value addition per Kg? .....

9. List the processing materials/ingredients used and their cost?

Material	Estimate cost.
i…….	…….
ii…….	…….
iii…….	…….

Transportation cost ……

10. About how much profit is made on that same quantity of fish sold? .....

11. Provide the following information on your buyers regarding where they come from and where they sell their fish?

Come from	Sells the fish at
i……	……..
ii……	……..
ii……	……..

12. Where do you get your source of information about your products?

    i. Taste……..

    ii. Consumer preference……..

    iii. Pricing……

    iv. Demand……

    v. Supply……..

13. Where do you store your produce and for how long?

Place length

I. Stoves [ ] …….

ii. Storage rooms [ ] …….

iii. Other specify…….. …….

14. Which of the following applies to the gender of your buyers?

Males [ ] Females [ ] Both [ ]

15. Do your buyers buy your fish on credit or outright payment?

I. Credit [ ] ii. Outright payment [ ] iii. Both [ ]

16. Do the fishermen give you the fish on credit or outright payment?

I. On credit [ ] ii. On outright payment [ ] iii. Both [ ]

17. What are your sources of credit/money used in doing business?

i) Self/partner [ ]

ii) Banks [ ]

iii) Susu/credit groups [ ]

iv) Friends and Family [ ]

Others……

18. How does the processing business benefit you and your household?

……..

19. About how much income do you make in a month from the processing business (if any)?……

20. How do you transport your produce to the marketing centres?

i) Special vehicle [ ] (ii) Passenger vehicle [ ]

21. Do you have any health challenges as a result of what you do?

(i) Yes [ ] (ii) No [ ] ……

22. Do you know of any improved method of stoves/ovens etc. to enhance your work than what you use?

    Please give details……

23. How do you package your products for sale? .....

24. What are the constraints and opportunities in your processing business?

25. Any interventions? ……

26. How do you think your constraints can be intervened? .....

    ……

27. Do you know of any institutions/stakeholders who work closely with processors providing capacity building, advice etc?

    If Yes please provide name

    Name……. Function……

    Name……. Function……

    Name……. Function……

    No [ ]

28. Do you have/join any Fish Processors' association?

    If Yes please provide name and its function below

    Name……. Function……

    Name……. Function……

    Name……. Function……

    NO [ ] Why?

Thank you!

APPENDIX F

INTERVIEW GUIDE

Wholesalers

Date: Interviewee's name:

Location: Contact:

Gender:

B. Socio-Demographic Background of Respondents

1. How old are you?

(ii) Below 21yrs (ii) 21-30yrs (ii) 31-40yrs (iii) 41-50yrs (iv) 51-60yrs

(v) above 60yrs

2. How long have you been involved in the fish wholesale business?

(ii) < 5yrs (ii) 5-10yrs (iii) 10-15yrs (iv) 15-20yrs (v) above 20yrs

3. Do you have employees?

Yes [ ] No [ ]

No.	Male	Female

4. What are the duties of your employees?

……

……..

……

5. What is the daily wage per person?

Amount in GHS……per week [] / per month []

Amount in GHS……per week [] / per month []

Amount in GHS……per week [] / per month []

6. Who do you buy from?

i. Fishermen [ ]

ii. Middlemen [ ]

iii. Frozen fish sellers [ ]

7. How much do you buy a Kg of the Croakers for? ……
8. How much is it sold for? ……
9. How much do you spend on the Kg of croakers before selling? ……
10. Where do you sell your products/fish? ……
11. How much profit do you make on that same quantity of fish? ……
12. How much income/profit do you make in a month on the croakers? ……...
13. What is your Total Monthly Income on fish (croakers plus other species)?…….
14. In what forms do you sell your fish? ……
15. Where do you get your source of information about your products?
    i. Pricing……
    ii. Demand……
    iii. Supply……..
16. Where do you store your produce and for how long?

Place		length
i. Stoves	[ ]	……..
ii. Storage rooms	[ ]	……
iii. Rented refrigerators	[ ]	……
iv. Own refrigerators	[ ]	……

iv. Other specify…….. …….

17. How do you convey your products to the market?

……..

18. Which of the following applies to the gender of your buyers?

Males [ ] Females [ ] Both [ ]

19. Do your buyers buy your fish on credit or outright payment?

I. Credit [ ] ii. Outright payment [ ] iii. Both [ ]

20. How do you pay for the fish?

I. On credit [ ] ii. On outright payment [ ] iii. Both [ ]

21. What are your sources of credit/money used in doing business?

i. Self/partner [ ]

ii. Banks [ ]

iii. Susu/credit groups [ ]

iv. Friends and Families [ ]

Others……

22. What are your other sources of income? ……..

23. Between which months do you make the most sales?

i……

24. How do you package your products?

25. How do you convey your products to the market?.....

26. How does the Croaker fish wholesale business benefit you and your household?

…….

27. What are your constraints and opportunities in this business and how can it be intervened?

    i. ……

    ii. ……

28. Do you know of any institutions/stakeholders that provide advisory support for you in your Croaker wholesale business?

    If Yes please provide the name

    Name…… Function……

    Name…… Function……

    Name…… Function……

    NO [ ]

29. Do you have/join any fish traders'/wholesalers' association?

    If Yes please provide name and its function below

    Name…… Function……

    Name…… Function……

    Name…… Function……

    NO [ ] Why?

Thank you!

APPENDIX G

INTERVIEW GUIDE

Retailers

Date: Interviewee's name:

Location: Contact:

Gender:

A. Socio-Demographic Background of Respondents

1. How old are you?

(i) Below 21yrs (ii) 21-30yrs (ii) 31-40yrs (iii) 41-50yrs (iv) 51-60yrs

(v) above 60yrs

2. How long have you been involved in the croaker fishing business?

(i) <5yrs (ii) 5-10yrs (iii) 10-15yrs (iv) 15-20yrs (v) above 20yrs

3. Do you have employees?

Yes [ ] No [ ]

No.	Male	Female

4. What are the duties of your employees?

……

……..

5. What is the daily wage per person?

Amount in GHS……per week [] / per month []

Amount in GHS……per week [] / per month []

Amount in GHS……per week [] / per month []

6. Who do you buy from?

i. Fishermen [ ]

ii. Middlemen [ ]

iii. Frozen fish sellers [ ]

iv. Processors [ ]

7. Where do you sell your products/fish? …….
8. How much is a kilogram/basin of fish? ……
9. In what forms do you sell your fish? ……
10. How much is that same quantity of fish sold for (Q 8)
11. About how much income do you make in a month from retailing the croakers? .....
12. Between which months do you make the most sales? ……..
13. How does the Croaker fish retail benefit you and your household? …….
14. Where do you sell your fish?

    i.……

    ii ……..

    iii …….
15. How do you deal with the following?

    i. Demand……

    ii. Supply……..
16. Where do you store your produce and for how long?

Place		length
i. Stoves	[ ]	……..
ii. Storage rooms	[ ]	……
iii. Rented cold stores	[ ]	……
iv. Own refrigerators	[ ]	……

v. Other specify…….. …….

17. How do you convey your products to the market?

……..

15. Which of the following applies to the gender of your buyers?

Males [ ] Females [ ] Both [ ]

16. Do your buyers buy your fish on credit or outright payment?

i. Credit [ ] ii. Outright payment [ ] iii. Both [ ]

17. How do you pay for the fish?

i. On credit [ ] ii. On outright payment [ ] iii. Both [ ]

18. What are your sources of credit/money used in doing business?

i. Self/partner [ ]

ii. Banks [ ]

iii. Susu/credit groups [ ]

iv. Friends and Families [ ]

Others……

19. What are your other sources of income? ……..

20. Between which months do you make the most sales?

……

21. How do you package your products? …….

22. What are your constraints and opportunities in the fish trading business?

Any interventions?

i…….

ii……

23. Do you know of any institutions/stakeholders that provide advisory services in your Croaker fish retail activities?

    If Yes please provide the name

    Name……. Function……

    Name……. Function……

    Name……. Function……

    NO [ ]

24. Do you have/join any fish traders' association?

    If Yes please provide name and its function below

    Name……. Function……

    Name……. Function……

    Name……. Function……

    NO [ ] Why?

Thank you

APPENDIX H

INTERVIEW GUIDE

Middleman/woman

Date: Interviewee's name:

Location: Contact:

Gender:

B. Socio-Demographic Background of Respondents

1. How old are you?

(ii) Below 21yrs (ii) 21-30yrs (ii) 31-40yrs (iii) 41-50yrs (iv) 51-60yrs

(v) above 60yrs

2. How long have you been involved in the croaker business?

   (i) <5yrs (ii) 5-10yrs (iii) 10-15yrs (iv) 15-20yrs (v) above 20yrs

3. What exactly do you do? i) Sponsor fishing trips

   ii) Buy and sell the Croakers

4. About how much do you invest in a fishing trip?
5. What do you do to the landed Croakers?
6. What is the mode of payment? …….
7. How many times do you sponsor a trip in a week?

   ……

8. What are the quantities of croakers sold per week? …….
9. How much is a Kg of the Croakers sold for? ……
10. About how much do you spend on a Kg and how much profit is returned?.....
11. About how much income do you make in a month from this business?

    .....

12. Between which months do you make the most sales on the Croakers?

    ……

13. Who buys from you?

14. How do you deal with the following?

    i. Demand……

    ii. Supply……..

15. Do your buyers buy your fish on credit or outright payment?

    i. Credit [ ] ii. Outright payment [ ] iii. Both [ ]

16. What are your sources of credit/money used in doing the business?

v.	Self/partner	[ ]
vi.	Banks	[ ]
vii.	Susu/credit groups	[ ]
viii.	Friends and Families	[ ]
	Others……	

17. What are your constraints and opportunities in this business? Any interventions?

    i……

    ii……

18. Do you have/join any fish traders' association?

    If Yes please provide name and its function below

    Name…… Function……

    Name…… Function……

    Name…… Function……

    NO [ ] Why?

APPENDIX I

INTERVIEW GUIDE

CONSUMERS

1. Age:
2. Sex:
3. Level of Education:
4. Marital status:
5. Profession (Social work, Self-employed, NGO, Retired, other)
6. Income per month Ghs: i) 100-500 ii) 500-1000 iii) 1000-1500 iv) 1500-2000 v) above 2000
7. How much quantity do you buy/consume per week in Ghs?
8. What do you consider before buying the fish i) the length ii) the weight
9. Whom do you buy from? i) fishermen ii) retailers iii) processors iv) wholesalers
10. Buying method i) laid down ii) bargaining
11. Any preference with the buying method…….
12. Purpose of purchase i) social events (funerals & parties) ii) husband/wife's preference iii) preferred fish protein
13. Do you have any close substitute? i) sardinellas ii) other demersals iii) non
14. Are you aware of the different types? i) Yes ii) No
15. Which of these types do you prefer i) smoked ii) salted iii) fried iv) fresh v) filleted
16. In what forms do you process your fresh one i) grilling ii) frying iii) salting iv) fresh in stew/soup
17. Why is it a preferred choice? i) taste ii) cheaper iii) easy to work on
18. I prefer fish scales and unwanted parts being removed ….. i) Yes ii) No

19. How would you rate the pricing? i) expensive ii) inexpensive iii) normal
20. Does your demand always meet the supply? i) Yes ii) No
21. How do you find the environment of purchase? i) very hygienic ii) non-hygienic iii) needs improvement
22. Any constraints and opportunities in this fishery?
23. How do you recommend it to other consumers?

Thank you!

APPENDIX J

INTERVIEW GUIDE

Financial Institution

1. Name of Financial Institution ……..…….
2. How long have you been operating in this community? …….…….
3. What kind of services do you provide for the fishers?

   …….....
4. Which of the following actors approach you often for support along the fisheries value chain and why? Fishermen, input dealers, processors, traders, wholesalers, retailers, (any other).

   …….
5. How much loans are normally requested and given to these actors? Please give range…….……
6. What are the terms of payment? ……...
7. Are they able to pay on time? ……...
8. What kind of collateral is considered before loans are given?

   .....
9. Which gender patronises your services most and who is prompt at payment?

   .....
10. Do you think there are any reasons why most people would need loans but may not want to come for it?

    ……

Thank you!