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The Delusion of the Profits: An Analysis of the Impact IUU Fishing on the Value of Ghana's Tuna Industry

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ABSTRACT

The tuna industry in Ghana contributes to the economy by employing directly over 3000 Ghanaians and creating indirectly many other jobs servicing the tuna sector. It also generates about 88% of the value of total exports of fish and fishery products from Ghana. In recent times, the tuna sector has been faced with Illegal, Unreported and Unregulated (IUU) fishing activities. This has affected the value of tuna and tuna products exported to the EU, which is the largest market of these products, importing over 75% of tuna and tuna products produced in Ghana. IUU fishing resulted in the banning of fish and fishery products from Ghana into the EU in 2013, impacting jobs and the inflow of foreign exchange from the fishing. The ban was lifted in September 2015 after Ghana made efforts to strengthen its fisheries management systems by including policies that were aimed at preventing, deterring, and eliminating IUU fishing activities. However, sections with the Fisheries (Amendment) Act 880 of 2014 and the Fisheries Act 625 of 2002 when analysed in comparison with other international fisheries regulations and specific cases of illegality in fisheries raises questions that require further research. There is a need to employ other management measures that will serve as a positive incentive in the fight against IUU fishing and also have the aim of promoting sustainable fisheries management. One of such measures is the introduction of ecolabels in Ghana's tuna fishing sector.

TABLE OF CONTENTS

1 Introduction 4
1.1 Problem statement 5
1.2 Justification 6
1.3 Data Gathering and Methodology 6
2 The Fisheries Sector in Ghana 7
2.1 Marine artisanal fishery 7
2.2 Semi-industrial fishery 7
2.3 Industrial fishery 7
2.4 Marine production by sector 7
2.5 Overview of the Tuna Fishery in Ghana 8
2.6 Challenges in Ghana's industrial tuna fishery 10
2.7 Fisheries Management in Ghana 12
3 fisheries management systems 12
3.1 The Icelandic Fisheries Management System 12
3.2 Monitoring, control and surveillance 14
3.3 International Co-operation and Bilateral Agreements 15
3.3.1 Challenges in the ITQ System 16
3.4 The Fisheries Management System of Ghana 16
3.5 International Fisheries Regulations Governing the Tuna Fisheries in Ghana 18
4 Illegal, Unregulated and Unreported (IUU) Fishing 19
4.1 The fundamental Causes of IUU Fishing 19
4.1.1 Impacts of IUU Fishing 20
4.2 Cost of IUU Fishing 21
4.3 The Becker Model of Rational Criminality 22
5 The Fsihereis Value Chain 23
5.1 The Value Chain of Cod Fisheries in Iceland 23
5.2 The Value Chain of the Tuna Fisheries in Ghana 26
6 Ecolabelling 29
7 Analysis 30
8 Conclusion and Recommendations 33

List of Figures

Figure 1. Map of Ghana 4
Figure 2. Variation in the value of the live weight import and export of fish (2010 – 2014) 5
Figure 3. Production share from the different marine sectors (2008 – 2014) 8
Figure 4. Tuna share in the Industrial Sector (2008 – 2014) 9
Figure 5 Tuna Live Weight Landing by Species and Vessels (19910 – 2011). SJT = Skipjack Tuna; YFT = Yellowfin Tuna; BET = Bigeye Tuna; BB = Bait-Boat; PS = Purse Seiner (O'Neil, 2013) 10
Figure 6. The Organisational Structure of the Directorate of Fisheries of Iceland 13
Figure 7. Collaborative Network of the Fisheries Management System of Iceland 13
Figure 8. The Effect of the Introduction of the ITQ in Iceland on a decline in the number of fishing vessels from 2002 – 2013 (DoF) 15
Figure 9. The Organisational Structure of the Fisheries Commission of Ghana 17
Figure 10. The Different Value Chain of Cod with respect to the kind of Fishery 24
Figure 11. Comparison between the values of demersal species for the period 2012-2013. ... 26
Figure 12. Map of the Value Chain of Tuna in Ghana. The demarcated area is the value chain of tuna processed for export 27

List of Tables

Table 1. Fines from the quayside inspection by FEU-MCSD of the Fisheries Commission ... 22
Table 2. Percentage of cod export in total marine exports to Europe and the US 26

1 INTRODUCTION

The Republic of Ghana is a coastal West African state that is boarded by Cote D'Ivoire, Burkina Faso, and the Gulf of Guinea and Atlantic Ocean with a total land area of about 239 thousand km^2 (Figure 1). It also has a marine coastline of 550 kilometres extending from Aflao in the East to Half Assini in the Western Region, a continental shelf of 24,300km^2 and an exclusive economic zone of 218,100km^2 (FAO, 2007).

Figure 1. Map of Ghana

The fisheries sector in Ghana contributes significantly to socio-economic activity (Aggrey-Fynn, 2001) and supports the livelihood of about 10% of the total population of about 28.3 million (GAIN, 2011; GSS, 2015). It also contributes to the national economy in terms of food security, employment, poverty reduction, GDP and foreign exchange earnings (Mensah, 2010). Currently, 1.1% of the total national GDP of about US$33 Billion is contributed by the fisheries sector (GSS, 2015).

The low price of fish compared to other sources of animal protein gives fish a competitive advantage over other protein sources with fish representing about 60% of the total animal protein intake. The national fish per capita consumption is estimated to be about 20-25 kg per annum, higher than the world average of 16 kg (GAIN, 2011).

The total annual domestic consumption of fish in Ghana is about 1.1 million metric tonnes but the sector is only able to produce about 413 thousand metric tonnes (Fisheries Commission, 2015). To reduce this gap, Ghana imports fish, mainly low value species such as mackerel, sardine, red snapper, and barracuda, from The Netherlands, Iceland, Senegal, Mauritania,

Morocco, United Kingdom, Sierra Leone and China. As shown in Figure 2, fish importation reduced from 200 thousand metric tonnes in 2010 to 146 thousand metric tonnes in 2014 because of the increase in aquaculture and the depreciation of the local currency to the dollar.

A total of 57,358.072MT (13.8%) of the domestic production is exported at a value of about US$318 million (Fisheries Commission, 2015). 42,250MT (10.2%) of the quantity exported is contributed by high value species such as tuna. Other high value species that are mainly exported to Asia are cephalopods (squid, cuttlefish and octopus).

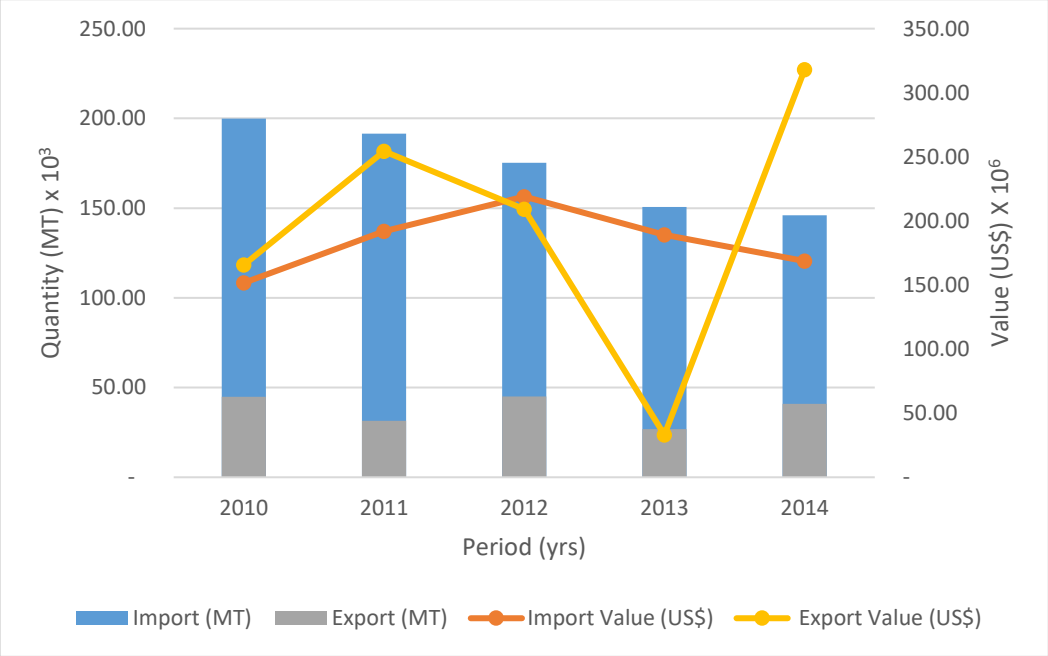

Figure 2. Variation in the value of the live weight import and export of fish (2010 – 2014)

1.1 Problem statement

IUU fishing was prevalent in Ghanaian fisheries up until 2013 when Ghana was blacklisted by the EU because enforcement of the regulatory framework was lacking. In March 2014, the EU blacklisted Belize, Cambodia and Guinea-Conakry on the basis of non-compliance to IUU fishing international laws. In the same month, Ghana, South Korea and Curacao were issued yellow cards.

Individuals and organizations involved in IUU fishing do so because it pays off, or at least committing a crime is worth the risk of penalties. Categorizing a fishing activity as a crime is not a fool proof method of deterring one from committing the crime. It is likely that if there were other legal alternatives with similar benefits, the probability of a risk-neutral individual to commit the crime will be lower.

The level of a crime has the tendency to grow with the rate of global development (Bennett, 1991). Therefore, it is a necessity that crime prevention methods are strategic and unique. This does not exclude the case of IUU fishing. Though Ghana has been issued a green-card by the European Union, it still runs the risk of being blacklisted in the event that the management systems fail.

In 2013, the blacklisting of Ghana by the EU led to a reduction in production from the tuna sector. Whole tuna export reduced by about 60%, reducing foreign exchange earnings also by

about 40%. In the case where Ghana, in the future, fails to honour its obligations in the fight against IUU fishing, and if it is blacklisted again, the tuna industry will be the hardest hit since its main market is the EU. There will be loss of jobs as a measure to reduce cost of production to maximise profits. Some processing plants may also have to shut down due to the losses that will be incurred from production. There will be competition in rival markets for sale of locally produced tuna products and the cost of fishing will be higher than the expected revenue generated, which might result in the ceasing of operation of some fleets and the increase in the price of raw products.

This study seeks to address the possible effects of IUU fishing by Ghana-flagged vessels pertaining to the economic loss from its activities and its effect on the value chain of the tuna industry in Ghana.

1.2 Justification

The tuna industry in Ghana is a thriving business sector but is heavily influenced by politics on the part of the government as well as within the industry itself. As a result, though there exists a regulatory framework it has little or no effect on the value chain due to lack of enforcement (O'Neil, 2013). According to O'Neil (2013), 'governance is weak within the industry and this is where value addition and upgrading is needed the most" (O'Neil, 2013). The weakness of the governance, as highlighted by O'Neil suggests that the governance structure, as well as regulatory framework needs to be upgraded to ensure compliance in the industry in the future. There is also the need to further analyse the regulatory framework and its effect of the value chain of the tuna industry.

The loss in revenue from any future IUU fishing in Ghana will be substantial. Therefore, Ghana has significant incentives to combat IUU fishing. The objective of this study is to understand the impacts of IUU fishing on the value chain of Ghana's tuna industry. It seeks to do so by identifying and evaluating the cost of IUU fishing in the value chain of the tuna industry in Ghana, identifying an alternate long term solution that could be considered in the fight against IUU fishing in Ghana, evaluating existing policy interventions made to combat IUU fishing and their effects on the tuna industry in Ghana and to recommend implementable remedies to defects in the value chain of the tuna industry.

1.3 Data Gathering and Methodology

Primary data was collected during informal and unstructured discussions with industry players in the tuna sector in Ghana and cod sector of Iceland as well as some government officials from these countries. Secondary data was obtained from web resources and some publications from Ghana. Discussions and interviews were held with legal experts as well as law enforcers for a better understanding of how systems in regulatory frameworks operate

This research is based on a comparative analysis between the Ghana Tuna Fishery and the Icelandic Cod Fishery using desktop research and deductive analysis to find solutions to the problem of IUU fishing. The legal frameworks on fisheries management in Iceland and Ghana were analysed comparatively. The theoretical background is based on economic behaviour about profit maximisation and alternate models on the rationality of criminal behaviour. It also gives insight regarding how people are likely to react to different incentives.

2 THE FISHERIES SECTOR IN GHANA

The fisheries sector in Ghana is divided into the marine and the inland/aquaculture sectors. The marine sector is comprised of the artisanal, semi-industrial (inshore) and industrial fisheries subsectors. The inland fisheries and aquaculture, as the name implies, consists mainly of fishing activities that occur within inland water bodies such as rivers, lakes, lagoons, ponds, raceways etc.

2.1 Marine artisanal fishery

The artisanal fisheries sub-sector comprises mainly of about 13,000 dug-out canoes operating within the inshore exclusive zone (30m depth) (Fisheries Commission, 2016). They operate using outboard motors with engine capacities up about 40HP (Amador et al, 2006). Smaller canoes rely on sails or paddles, allowing them to operate in shallower waters. Fishing gear employed in this sub-sector include purse seines, beach seiners, set nets, draft gill nets and hook and line. Another fleet of motorised canoes, referred to as 'lagas', specialised in hook and line fishing use insulated containers packed with ice to store high value fish. A few of them use echo-sounders to locate fish.

2.2 Semi-industrial fishery

The semi-industrial/inshore fisheries sub-sector is made up of vessels built primarily from wood with a length between 8 and 37 meters. These vessels are powered by in-board motors with up to 400 HP (FAO, 2004). There are about 327 licensed vessels operating within the entire EEZ (Fisheries Commission, 2016). However, larger semi-industrial vessels are not allowed within the inshore exclusive zone (IEZ) (Fisheries Act 625, 2002). Many of these vessels use purse seine during upwelling seasons but may also operate as trawlers in shallower waters (beyond the IEZ) during off-seasons (FAO, 2004).

2.3 Industrial fishery

The industrial fisheries sub-sector is comprised of very large, foreign-built vessels constructed mainly from steel. They have high-powered internal engines of up to 3000HP. They also have auxiliary engines. These include trawlers, shrimpers, tuna pole and line (bait-boats) and purse seiners (FAO, 2004). There are about 123 active vessels operating within the EEZ. By law, they are permitted to operate beyond the IEZ (Fisheries Act 625, 2002).

2.4 Marine production by sector

The artisanal sub-sector is the most undeveloped sector of the three sub-sectors, however it is the most important in terms of fish outputs, as can be seen in Figure 3. In 2014 it produced about 68.7% of the total production from the marine sector. The industrial sub-sector including the tuna fleet produced 28.4% whilst the inshore fleet recorded the lowest share of production at 2.9%. The medium quality of fish produced by the artisanal sector makes it affordable for domestic market.

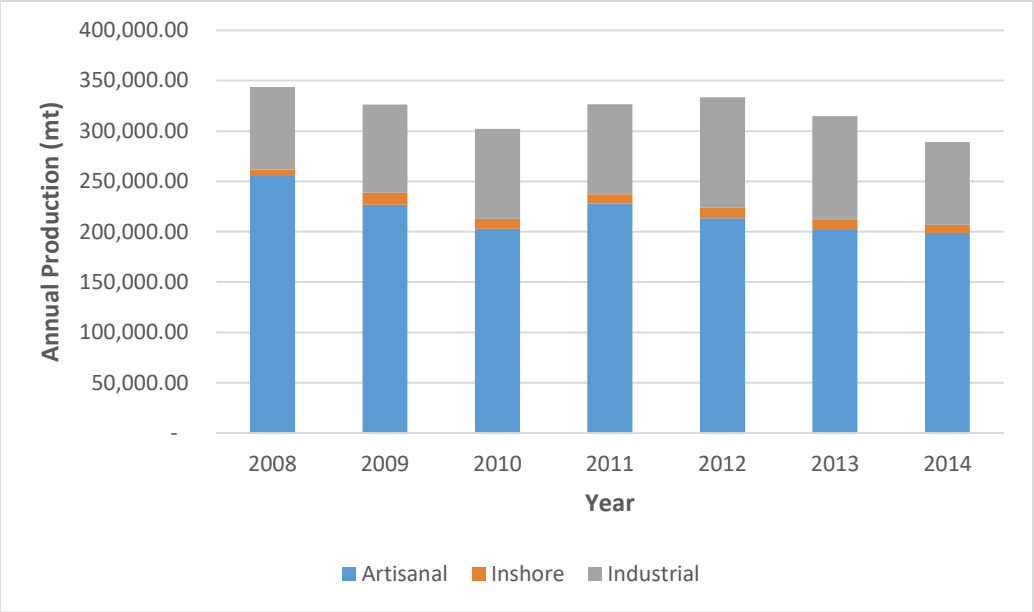

Figure 3. Production share from the different marine sectors (2008 – 2014)

The reduction in the total marine fisheries production in Ghana can be attributed to both natural and man-made causes such as dynamic climatic conditions and overfishing and poor management practices. According to the Fisheries Commission, "The unfavourable climatic conditions resulting in warmer sea-surface temperatures (from global warming) and lower upwelling index in 2014 could be a cause for worry so far as fish production is concerned" (Fisheries Commission, 2015). All of these coupled with the apparent continuous use of unorthodox methods like the use of chemicals, high-powered lamps and undersized meshes in fishing by both the artisanal and inshore sectors is exacerbating pressure on the stocks leading to dwindling fish stocks. The open access policy, overcapacity and use of illegal nets are all causes for low stock levels that are evident in the levels of catches (e.g. small pelagic species) (Fisheries Commission, 2015).

Production from the inland fishery sector is considered as high value mainly for domestic consumption. Insignificant quantities (<1%) are exported mainly to the EU as raw or semi-processed products (salted, dried, smoked, fermented or fish powder) (Fisheries Commission, 2016). Comparing 2000 and 2010, aquaculture has experienced a significant growth whiles marine production has declined by about a 100 thousand metric tonnes. This is clear evidence of a short fall in the management of the marine sector coupled with climatic change.

2.5 Overview of the Tuna Fishery in Ghana

Over 75% of the total production from the industrial sub-sector is contributed by the tuna fleet (Figure 4). Bait-boats (pole and line) and purse seiner compose the main fishing fleet in tuna fishing in Ghana. The Fisheries Scientific Survey Division of the Fisheries Commission in Ghana reports that tuna fishing was dominated by the bait-boats until the re-introduction of purse-seiners in 1996. Since 2012, 20 bait-boats and 17 purse-seiners have been operational within the EEZ along the coastal waters of Ghana and in some cases beyond, provided they have obtained valid licences from third party states to carry out their fishing activities in foreign waters.

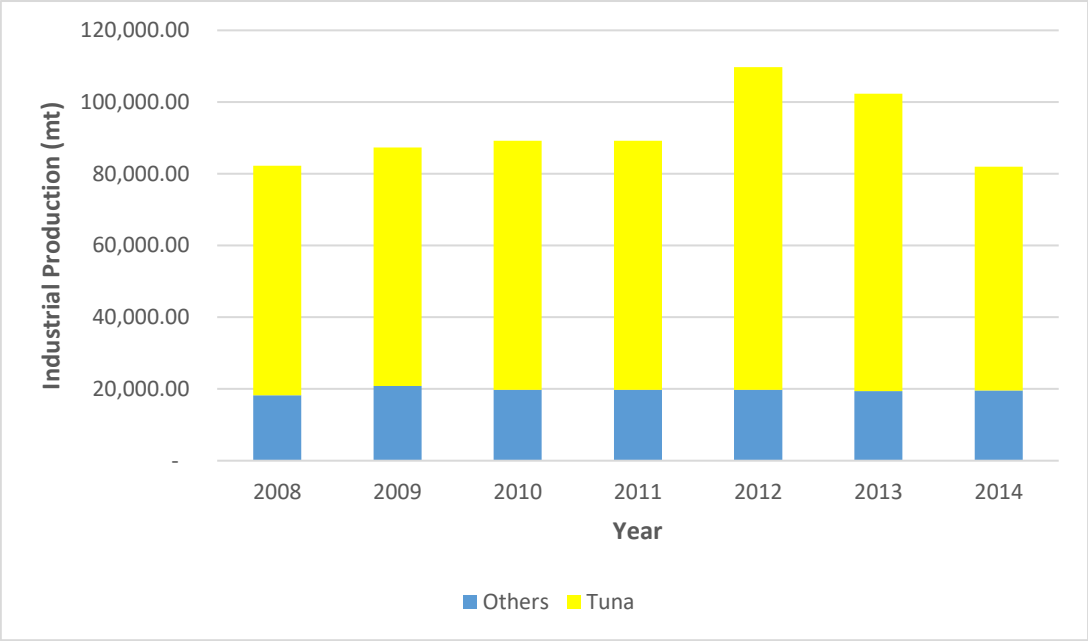

Figure 4. Tuna share in the Industrial Sector (2008 – 2014)

With the advancement in the technology used in fishing, the re-introduction of the purse seining increased the catch from about 35,000MT in the 1970-1980s to over 60,000MT currently (approximately 12% of total marine production). This is attributed to the growth of the tuna industry and the demand by the increased number of tuna processing companies in Ghana. The increase in the number of tuna vessels will have a negative impact on the tuna resource if the fleets catching the tuna are not managed in a sustainable manner (FAO, 2006). Skipjack is widely distributed in temperate and tropical regions and has high fecundity rates. These characteristics make the species relatively resilient to exploitation (FAO, 2006). However, it is important that the effort on the stock is controlled for sustainable reasons.

Anchovies (*Engraulis encrasicolus*) are used as bait by the bait-boats during fishing. The anchovies are thrown into the water where the shoals of tuna are located. Poles made mainly of bamboo with long lines with hooks are thrown into the water and the tuna hooked and tossed on board. The bait-boats and purse-seiners form an alliance in an activity called collaborative fishing, employing the services of Fish Aggregating Devices (FADs) that aid in the capture of large quantities of tuna species. There is a total of about 1,500 FADs being used by both fleets, contributing to 85% of the total catches (FSSD, 2015) in the sector. During collaborative fishing the catches are normally shared amongst the two fleets.

The primary tuna species exploited within the EEZ of the marine coastal waters of Ghana are Skipjack tuna (*Katsuwonus pelamis*), Yellowfin Tuna (*Thunnus albacares*) and Bigeye Tuna (*Thunnus obesus*) as can be seen in Figure 5. Though Skipjack is the most exploited it has the lowest value compared the Bigeye and Yellowfin (FSSD, 2015).

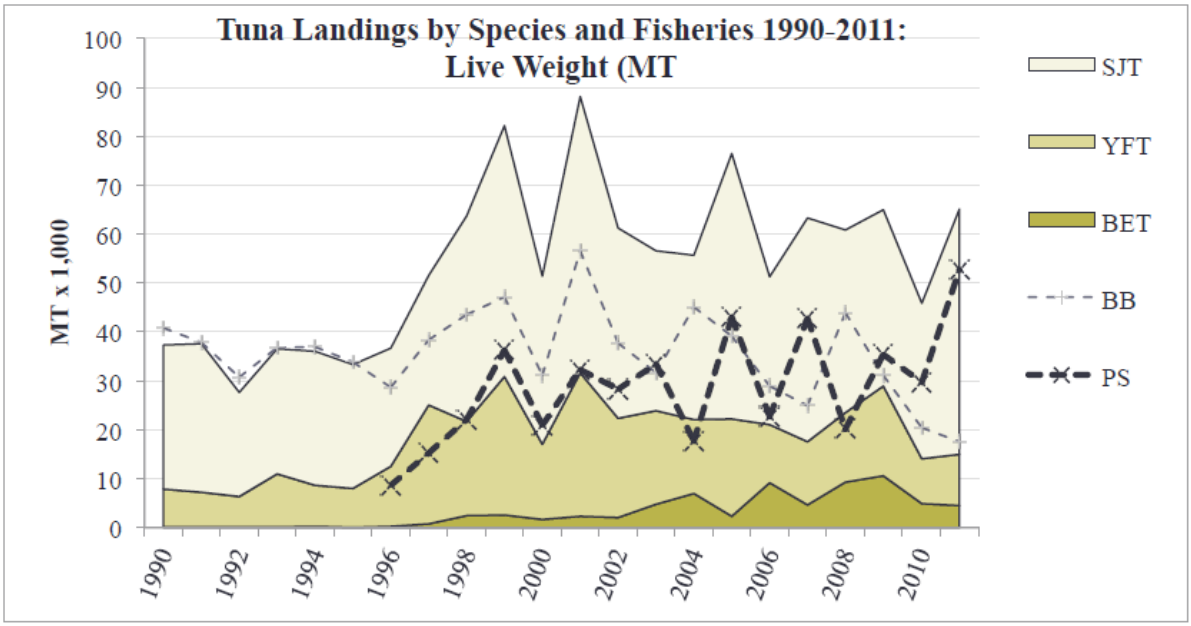

Figure 5 Tuna Live Weight Landing by Species and Vessels (19910 – 2011). SJT = Skipjack Tuna; YFT = Yellowfin Tuna; BET = Bigeye Tuna; BB = Bait-Boat; PS = Purse Seiner (O'Neil, 2013)

The tuna industry is within the private sector in Ghana. Currently, there are four tuna processing companies in Ghana. The processed tuna is mainly exported to foreign markets, specifically Europe. Tuna loins and whole round cuts have market demands from Asia, typically Japan.

The tuna fisheries represents an important portion of the fisheries sector, employing over 3,000 workers directly (O'Neil, 2013) and for the past three years has been producing about 60,000 – 70,000MT of a mixed variety of species annually at a value of about US$97 million, or approximately US$1,500.00 per metric ton. About 65% of the total production of tuna is exported at a value of about US$63.4 million (19.9%).

About 75% of all tuna exports to the European Community end up canned with weights that range between 80g and 640g with an average price per can between US$2.00 – US$10/ unit (O'Neil, 2013).

2.6 Challenges in Ghana's industrial tuna fishery

Recent innovations in the tuna fishery in Ghana have led to a more pragmatic approach in solving the problems of associated fish shared between bait-boats and purse-seiners and from FADS. Collaborative fishing has distorted the real species composition of the catch creating uncertainties in stock synthesis of the various fleets. Various approaches from objectives of the Data Fund, of International Commission for the Conservation of Atlantic Tuna (ICCAT), for Quality Assurance (ICCAT , Res. 03-21), have been addressed seeking to evaluate and improve sampling at port and analysis of our database. Since 2006, under the Japanese Data Improvement Project (JDIP) of ICCAT, a new sampling protocol and software codenamed AVDTH (Le Chauve, 2001) was adopted for Ghana (SCRS/2006/051). A lot of workshops dedicated at improving Data Collection and Quality Assurance (ICCAT , Res. 03-21) on Ghana have been held and reports published (SCRS 2003/010; SCRS2004/035; JDIP/SC3/06/05; SCRS 2009). The purpose of these workshops was to improve the data collected on the tuna species in order to resolve the uncertainties resulting from collaborative fishing.

In recent reports by ICCAT, the following were recommendations were made for the short term:

- Sampling catch of Ghanaian flagged vessels landing in Abidjan should be carried out as some vital information is lost from the database in Ghana.
- Observers should be placed on Ghanaian vessels including those landing in Abidjan to provide verification of logbooks and to sample catches at sea.
- Efforts should be made to validate logbook information, e.g. with observers and VMS.
- Training and re-training officers on board vessels in the proper recordings of logbook recordings
- The recovery of all outstanding logbook data from 1982-1995;
- Recruitment of more permanent staff and samplers in addition to the provision of more equipment such as computers and accessories

According to the ICAAT Recommendations (ICCAT, Rec. [14-01]; ICCAT, Rec. [15-01]), Ghana is under international obligation to have 30 % of tuna fleet operating in its waters being monitored by observers. Failure to oblige may result in sanctions as well as market closures. The FSSD reports improvement in the collection and verification of data at sea since 2009 with support from the Government of Ghana and the Japan Data Management Improvement Project (JDMIP). It has also improved in the information gathered on compliance of vessels to fisheries regulations. As stated earlier, a commendable effort by the Fisheries Commission of Ghana to comply with ICCAT's recommendations is the purchase of the newly installed VMS in the middle of 2013 to monitor the industrial vessels, which includes the tuna fleet (Fisheries Commission, 2014).

Bigeye tuna stocks are considered overfished worldwide by the World Wildlife Foundation (WWF) (Lack, 2007). In Ghana, an annual quota of 4,722MT of bigeye tuna is issued by ICCAT. ICCAT, in its effort to reduce the effort on tuna, specifically Bigeye and Yellowfin, has introduced payback policies to reduce effort or reducing catches of species due to over harvest or exceeding the assigned quotas. The multispecies nature of the fishery does not heed to the premise of targeting one species. Ghana was noted to have overharvested its Bigeye quota in the mid 2000's and had to generate a payback policy for 10 years from 2013. ICCAT is monitoring this payback scheme that means the Bigeye catches each year should not exceed the quota allocated. This has also led to the reduction of our purse seine fleet that is over the limit set at 2010 of 13. This is also being done with the reduction in the fleet size from 17 to 13, or the replacement of 2 bait-boats with 1 purse seiner.

This process involved issuance of a European Community Catch Certificate (ECCC) under the EC Regulation 1005/2008 for all products being exported to the EU, which has been upgraded. The Monitoring, Control and Surveillance Division (MCSD), the Fisheries Scientific Survey Division (FSSD) and the newly formed Catch Certification Unit (CCU) are the divisions and units charged with the certification process. Also, the Fish Landing Management System (FLMS) was deployed in 2015 to support the ECCC with traceability of fish and fishery products exported to the EU. These interventions have been put in place to prevent, deter, and eliminate illegal, unreported and unregulated (IUU) fishing.

The Fisheries Commission, in accordance with the Fisheries Act 625 of 2002, Sections 132 and 133, has banned transhipment at sea by Ghana-flagged vessels since 2006. Ghana-flagged vessels were found guilty of this offense from 2007-2010. This act resulted in a harsh criticism by ICCAT. Currently, transhipment is only allowed at port. With the aid of a new vessel monitoring system and the Regional Observer Programmes (ROP's), Sections 132 and 133 of the Fisheries Act 625 are being enforced.

2.7 Fisheries Management in Ghana

The Ministry of Fisheries and Aquaculture Development (MOFAD) is the government body in charge of managing the fisheries sector in Ghana. The Fisheries Commission (FC), under MOFAD executes the management objectives. Its mission is to promote sustainable and thriving fisheries enterprises through research, technology development, extension, and other support services to stakeholders (fishers, processors and traders) to ensure fish food security.

The fisheries policy is structured around four thematic areas. These are;

i. the management and conservation of aquatic resources and protection of their natural environment;
ii. the promotion of value addition in the fisheries sector and the improvement of livelihood in the fisheries communities;
iii. the sustainable development of aquaculture; and
iv. the improvement of services provided to the sector by the ministry of fisheries and other supporting institutions

For international compliance, the structure of fisheries management system in Ghana has been designed using the Code of conduct for Responsible Fisheries (CCRF) policy matrix and the integrated development strategy and coastal area management models.

3 FISHERIES MANAGEMENT SYSTEMS

Fisheries management systems worldwide are designed to promote sustainability of the fishery, and with time are modified. For this study, a general overview of two management systems will be given but targeted towards a fishery. Also, this section will deal strictly with management in the marine sector. The Icelandic and Ghanaian management systems were selected for comparison and clarification purposes, giving clear understanding into various management systems that exists and the effect they pose on the fishery of their nations.

3.1 The Icelandic Fisheries Management System

The Icelandic fisheries management system is a controlled access system where the quantity of fish harvested from the resource is based on recommendations by the Marine Research Institute (MRI), an independent scientific research body. Fishers are given catch quotas for specific species annually and may transfer a portion of their quota to another fisher. This system of management is known as the Individual Transferrable Quota system (ITQ).

The Directorate of Fisheries (DoF) (Figure 6) is the competent authority under the Ministry of Industries and Innovation (MoII) (Figure 7) that deals with the monitoring and daily administration of the fisheries management system.

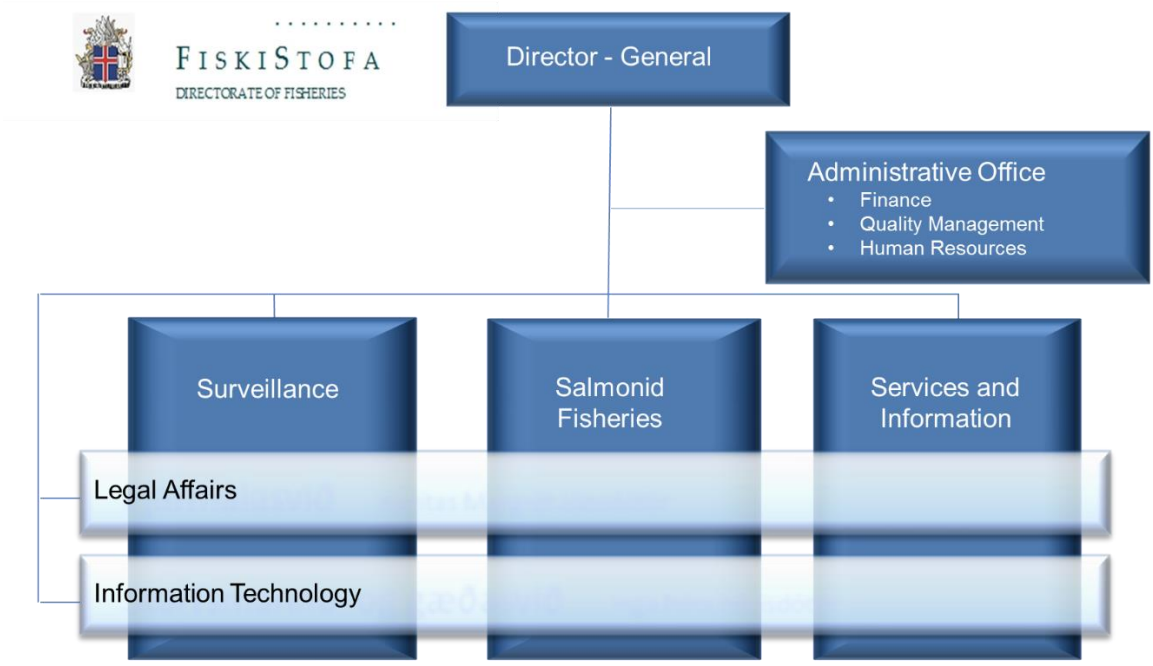

Figure 6. The Organisational Structure of the Directorate of Fisheries of Iceland

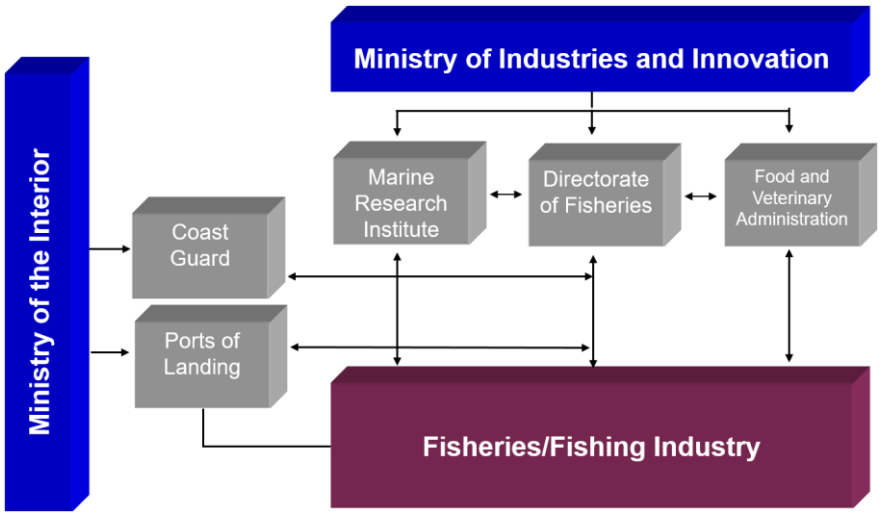

Figure 7. Collaborative Network of the Fisheries Management System of Iceland

With scientific research and data analysis, the MRI generates a Total Allowable Catch (TAC) that it recommends to the MoII. Based on these recommendations and consultations with stakeholders, the Minister decides on the TAC for each fishing year (September 1 – August 31). The Directorate of Fisheries allocates the TAC to the vessels based on the quota shares of each vessel. This forms the basis of the ITQ fisheries management system of Iceland.

A quota share is percentage of the TAC of a specific species. It is what gives the fisher the right or ownership of a fishery over a period of time. Quota shares are obtained when a newly introduced species is fished for over a period of 3 years. Initially, it is an open access fishery for that species. The fishers can compete during this period to gain quota shares. Alternatively, the fisher may decide to sell his quota share to another boat owner or a new entrant. The sale of a quota share is a permanent process and can only be regained through a repurchase.

The MRI generates a TAC to protect and preserve stocks for sustainability of the fisheries. The DoF, based on information from MRI, manages the ecosystem through other management measures such as area restrictions, fishing gear restrictions, and the use of closed areas to conserve important vulnerable habitats.

With the use of Vessel Monitoring Systems (VMS) DoF works closely with the coastguard to monitor fishing vessels and fishing activities. The coast guard is equipped with vessels and aircraft for aerial monitoring and search and rescue.

Despite recommendations by the MRI on TACs, the system itself is partly self-managed where the fishers act as security of the resource in their own interest. For example, TACs are allocated. The fishers understand that dumping affects the total stock of a species and the TACs are allocated on species basis. This is because the removal of a quantity of fish from a quota affects the overall quota for that species.

The quota system allows for fishing of specific species in specific areas only. This means that vessels without a quota for a given species are not allowed fish in areas where stock for other species are abundant. For example, vessels without quota for redfish are not encouraged to fish in redfish zones. However, in the case where by-catch is found in the harvest, fishers are allowed to trade off or buy quotas from vessels that have permissible quotas for the by-catch.

3.2 Monitoring, control and surveillance

Through inspections and patrols by the collaborative effort of the DoF and the coastguard, compliance issues in relation to fishing gears and methods are minimal. The licences to operate fishing vessels are cheap but the quota shares for the stocks are extremely expensive, limiting new entrants into the fishery and thus, minimising the effort on the resource by controlling the overall number of vessels. This is evident in the reduction of vessels from with the implementation ITQ system of fisheries management was established in Iceland as can be seen in Figure 8.

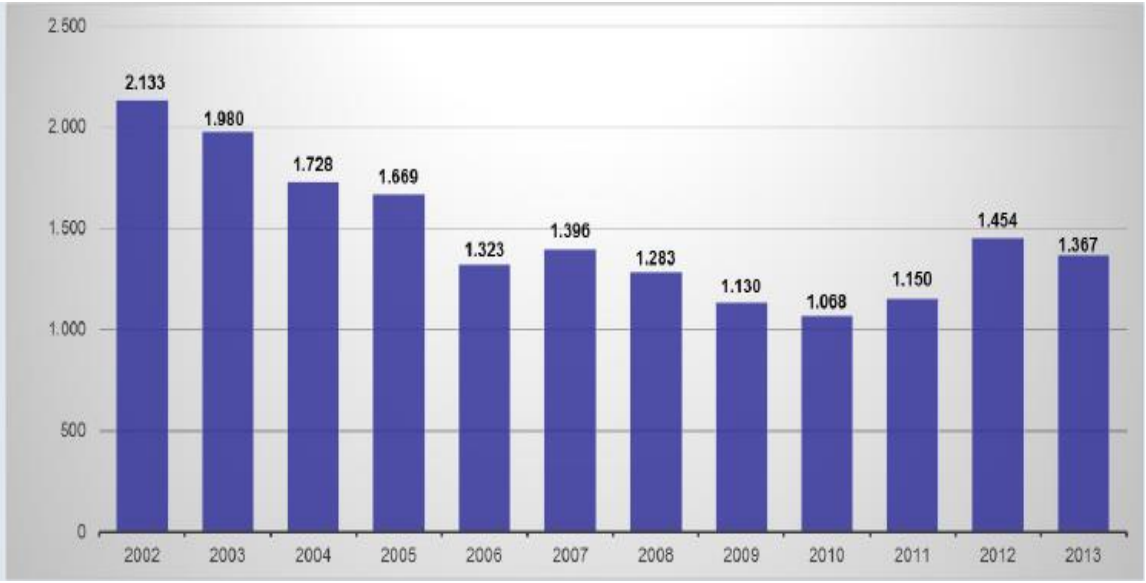

Figure 8. The Effect of the Introduction of the ITQ in Iceland on a decline in the number of fishing vessels from 2002 – 2013 (DoF)

3.3 International Co-operation and Bilateral Agreements

Iceland is a member of several international organisations relating to fishing activities. These include the North East Atlantic Fisheries Commission (NEAFC), the Northwest Atlantic Fisheries Organization (NAFO) and the International Council for the Exploration of the Sea (ICES).

The Government of Iceland has bilateral agreements in fishing and information sharing with the EU, Faroe Islands, Greenland, Norway and Russia. A list of vessels from the competent authority of each country under the agreement is sent to the DoF in Iceland, requesting for access to fish within Iceland's EEZ. Bulk quotas are issued to each country based on these agreements. The DoF controls the fishing effort of the vessels by limiting the number of vessels that can fish within the EEZ at a time. The DoF also ensure that the vessels do not fish more than their quotas. Information related to the catch is reported to the DoF by the competent authorities of the individual countries via the fishing monitoring centre.

The ITQ system in Iceland is a transparent system where all information about the fisheries is available online, giving everyone access to view the status of the fisheries. This includes real-time information on landed catch and quota status of each vessel. It also increases the investment opportunities both nationally and internationally by providing investors with information on where and how to invest in the Icelandic fisheries. Also, access to online monitoring of the fisheries incentivises the investors.

The regulatory system is flexible allowing the fishers to benefit from it. Quotas for specific species can be converted into other species within certain and very low limits, allowing fishers to fully exploit the available resources. Also, in cases where by-catch is landed it is sold and 80% of the sales goes into a special fund for fisheries development that is managed by Ministry and the 20% is used to cover the cost of salaries of the fishers. The ITQ system allows the fishers to fish 5% more than the quota allocated for each year. This gives the allowance to avoid any penalties that may be incurred for overfishing.

Catches more than catch quotas may result in suspension or revocation of fishing licences or the payment of levies and fines. The vessel operator in question also must pay the value of the quantity in excess of quotas to the state treasury. This is made public on the DoF's website for the purpose of transparency. It also serves as a method to "name and shame" those who disobey the rules. Major or repeated willful offences result in detention or imprisonment for up to six years.

3.3.1 Challenges in the ITQ System

The system is primarily exploited by the big companies which own a larger quota share and have a larger influence on the fisheries. Some of these companies are the large vertically integrated companies (VICs) which can be very influential.

A fisher who has been charged with non-compliance to the fisheries regulations may lose his license to fish. However, this is ineffective because the offender may rent another vessel to continue his fishing activities. Also, the fines for non-compliance are low compared to the revenue generated by these companies. Therefore, the deterrence from an illegality with respect to the payment of fines is considered as ineffective.

The fisheries management system of Iceland provides a security for the resource as well as for the fisher. Stocks are reserved and harvested in a sustainable manner that also protects ecosystem. Harvested stocks are purely quality dependent, generating enough revenue to support the livelihoods of the fishers as well as the entire sector.

3.4 The Fisheries Management System of Ghana

The Ghanaian fishery management system is governed by an open access system where fishers obtains rights to fish once they have satisfied all the conditions through an application to the competent authority. A permit is then granted to the applicant import and operate a fishing vessel under the condition a license is purchased. The license fees are calculated based on the gross registered tonnage of the vessel and may be purchased quarterly or annually per vessel.

However, in the artisanal sub-sector fishers are not required to obtain permits and licences before going out to fish, but they are required to declare their catches to fisheries officers stationed at landing sites. Contrarily, semi-industrial and industrial vessel owners must apply to the competent authority to gain access to the fishery by obtaining permits and licenses to operate.

The current legislation governing the fisheries sector, (ACT 625 of 2002 and LI 1968 of 2010) provides for regulation and management of the fisheries, the development of the industry and the sustainable exploitation of the resources in conformity to national and international laws.

The Fisheries Commission is the competent authority under the MOFAD mandated to enforce the current legislation. The effectiveness of this Commission is a result of the collaborative effort from its divisions and units as shown in Figure 9.

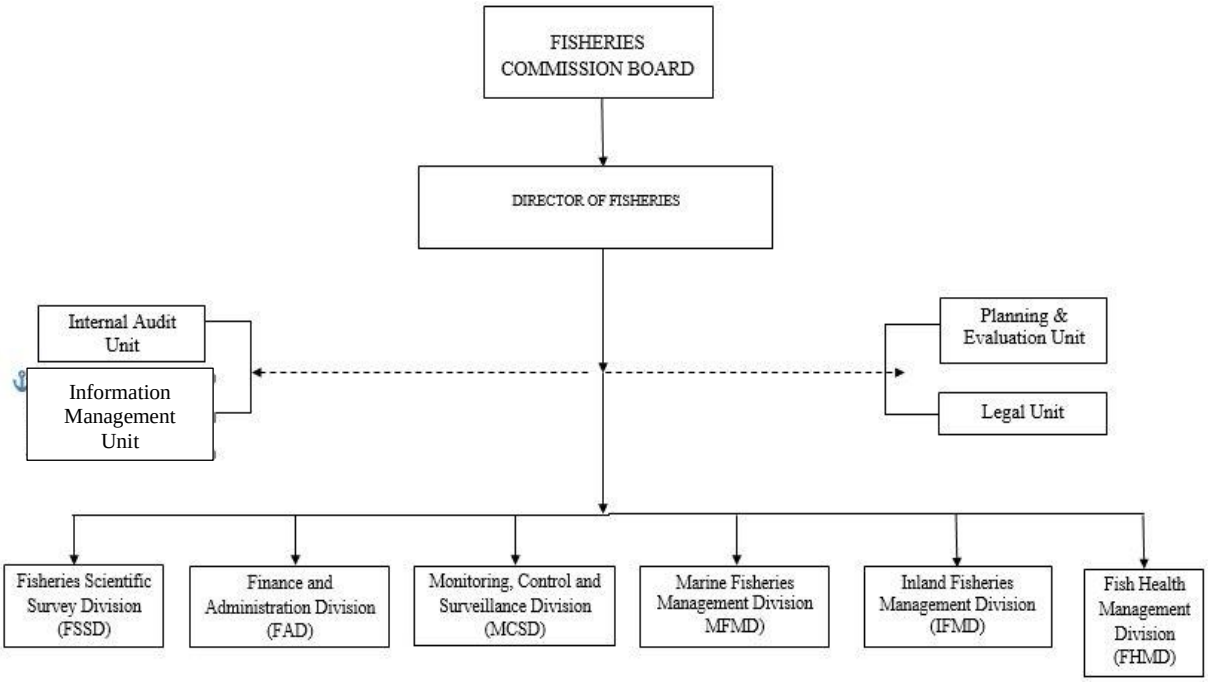

Figure 9. The Organisational Structure of the Fisheries Commission of Ghana (Source: Fisheries Commission, Ghana)

The Fisheries Scientific Survey Division (FSSD) is involved in scientific research through stock assessments and marine environmental analysis to inform marine management fisheries plans. Through its collaborative effort with foreign organisations such as the Food and Agricultural Organisation (FAO), the International Commission for the Conservation of Atlantic Tuna (ICCAT), the United Nations Educational, Scientific and Cultural Organization (UNESCO) and foreign research institutions that have interests in the resources of the Eastern, Central Atlantic better management guidelines are developed by sharing of ideas and knowledge on the resources and how they are impacted by environmental factors.

The Marine Fisheries Management Division (MFMD) is responsible for the registration, permitting and licensing of all fishing vessels in the fishing industry. It forms a link between the fishers and the fishing communities to improve their livelihoods by working together with the other stakeholders to formulate and implement programmes and policies for the sustainable marine exploitation, including marine conservation and restoration. It also facilitates the provision of infrastructure such as landing sites and cold chain facilities for the fishing industry. Imports and exports of fish and some fishery products are managed by this division.

Fisheries intelligence and the enforcement of the fisheries regulation is handled by the Monitoring Control and Surveillance Division MCSD. The division is equipped with a vessel monitoring system (VMS) for ensuring compliance at sea.

The Fisheries Enforcement Unit (FEU), made up of the marine police, the navy and specially trained MCSD officers is involved with enforcement of the fisheries regulations. It organises sea patrols and beach combings at landing sites, ports and within the EEZ. Occasionally, arrests are made and the culprits are taken before an arbitration committee and sanctioned.

3.5 International Fisheries Regulations Governing the Tuna Fisheries in Ghana

Though the current legislation governs the industrial fleet, they are largely monitored by and influenced by internal organisations such as the International Commission for the Conservation of Atlantic Tuna (ICCAT) and the European Union (EU). The concerns of these organisations are in line with the Code of Conduct for Responsible Fisheries (CCRF). ICCAT as a regional body has a mandate to protect and manage the resources through data gathering, data analysis and research, for the betterment of all countries within the convention. It produces publications on the resources and has an intimate relationship with each member country within the convention to enforce its regulations. Ghana, as a member country of ICCAT is obliged to adhere to all its conventions, regulations, and recommendations.

This is regulated through the ICCAT Bigeye Tuna Re-Export Certificate (IBTRC), which accompanies every bigeye tuna export from Ghana. Also, the number of vessels and the type of fishing gear used is also monitored by ICCAT. Ghana is limited to 13 purse seiners fishing for bigeye stock annually (ICCAT Rec. [14-01]).

Other interventions of ICCAT includes the filling of logbooks for each fishing trip. Observers are put on-board tuna vessels to monitor fishing activities of the vessels to prevent, deter and eliminate all aspects of IUU fishing. The captains of the vessels are also required to record and submit log data to the competent authority on arrival at port before fish is discharged. The data in the logbooks is used by the FSSD for scientific research to better manage the resource.

The open access nature of the fisheries management system in Ghana creates an incentive for individuals to try to cheat the system. Stocks are be harvested without any control over the quantity, quality, or size.

ICCAT is a Contracting Party to the United Nations Convention on the Law of the Sea of 10 December 1982 (UNCLOS) relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks of 4 August 1995 (UN Fish Stocks Agreement) and has accepted the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas of 24 November 1993 of the Food and Agriculture Organization of the United Nations (FAO, Compliance Agreement).

Over the years, the European Union has taken keen interest in topic of IUU fishing activities worldwide. The failure to comply to fisheries regulations, both nationally and internationally has resulted in the depletion of fish stocks.

The regulations by the EU which governs the transactions as well as trade of fish fishery products through certification of compliance by the competent authority of the flag state is the Council Regulation (EC) No 1005/2008 of 29 September 2008. This involves the validation by the competent authority of a flag state of completed European Community Catch Certificates by exporters exporting fish and fishery products to the EU. This serves as a guarantee for compliance.

The Icelandic Fisheries Management System compared to the fisheries management system in Ghana advanced and well managed. The ITQ system, clearly, supports sustainability of a compared to the open access system. In Icelandic fisheries, advanced technology and software have been incorporated into the monitoring and enforcement of its fisheries regulation. However, the same is not applicable in Ghanaian fisheries. The high cost of enforcement because of the larger size of Ghana's fisheries sector coupled with Ghana's status as a

developing country complicates issues such as MCS, there making the fisheries sector prone to illegalities.

4 ILLEGAL, UNREGULATED AND UNREPORTED (IUU) FISHING

According to the United Nations Food and Agricultural Organisation International Plan of Action to prevent, deter and eliminate IUU fishing (UN-FAO IPOA-IUU) Illegal, Unreported and Unregulated (IUU) fishing can be defined as follows:

Illegal fishing refers to activities:

- *Conducted by national or foreign vessels in waters under the jurisdiction of a State, without the permission of that State, or in contravention of its laws and regulations;*

- *Conducted by vessels flying the flag of States that are parties to a relevant regional fisheries management organization but operate in contravention of the conservation and management measures adopted by that organization and by which the States are bound, or relevant provisions of the applicable international law; or*
- *In violation of national laws or international obligations, including those undertaken by cooperating States to a relevant regional fisheries management organization.*

Unreported fishing refers to fishing activities:

- *Which have not been reported, or have been misreported, to the relevant national authority, in contravention of national laws and regulations; or*

- *Undertaken in the area of competence of a relevant regional fisheries management organization which have not been reported or have been misreported, in contravention of the reporting procedures of that organization.*

Unregulated fishing refers to fishing activities:

- *In the area of application of a relevant regional fisheries management organization that are conducted by vessels without nationality, or by those flying the flag of a State not party to that organization, or by a fishing entity, in a manner that is not consistent with or contravenes the conservation and management measures of that organization; or*

- *In areas or for fish stocks in relation to which there are no applicable conservation or management measures and where such fishing activities are conducted in a manner inconsistent with State responsibilities for the conservation of living marine resources under international law.*

4.1 The fundamental Causes of IUU Fishing

Fishing, whether legal or illegal, is an economic activity. An underlying result from theory of crime and punishment is that, “a risk-neutral individual will commit an offence if and only if his anticipated returns is higher than the anticipated punishment for committing that crime” (Becker, 1968; Stiegler, 1971). Indirectly, this means that if he still makes a profit after being

punished or sanctioned after the offence his chances of committing the same offence or another offence is high. This forms the basic cause for IUU fishing activities.

The poor enforcement or implementation of monitoring, control and surveillance measures and failure of governance in addition to the high demand of fish and fishery products by the global market is contributing to the increasing number of IUU activities (OECD, 2008). Some fishers take advantage of the weakness in the system to sell fish that has been caught illegally, with aim of making higher profits. Unfortunately, this is common among developing countries that lack resources to deter and eliminates acts of illegalities in their coastal waters (FAO, 2002).

4.1.1 Impacts of IUU Fishing

Illegal fishing activities and methods of fishing have adverse effects on the overall stocks of fish resources of a fishery. High fishing mortality rates, growth overfishing are a threat to the sustainability of a stock and in some cases are a result to IUU fishing (Tinch, Dickie, & Bruno, 2008). The use of inappropriate and non-selective fishing gear is responsible for 20 million metric tonnes of fishing mortality worldwide (Cook, 2001). Juvenile species suffer mortality or removal from the system due to the use of small mesh sizes, chemicals, and high-powered lamps by illegal fishers.

Fishing methods targeted solely at large species have a long-term effect on fish stock populations if it is not done in a sustainable manner. For example, the removal adult fish which contribute quota to available stocks through their spawning activities. This has a negative effect on the replenishment of the stock (Tinch, Dickie, & Bruno, 2008).

Short-term benefits of IUU fishing include job creation and revenue generation. This is most evident in developing countries that have been targeted by IUU vessels. The cost of labour in developing countries is cheaper and the overall profit generated is higher than the expected cost of apprehension. However, in the long term, these effects begin to fail and yield adverse results. Fishing communities that depend solely on fishing as a source of livelihood are most affected. Employment opportunities as well as revenue reduce due to low catch levels resulting from depleted stocks (Le Gillac & Cox, 2006; eftec, 2008).

Competition within the industry may result in a greater IUU activities and also affects fishing communities. Fishing communities that tend to compete with industry engage in IUU. Small-scale fishers in these communities stand the chance of losing more if they are caught and sanctioned by authorities (Tinch *et al*, 2008).

The delusion of profits from the sale of illegally caught with time affects the economy negatively. Initially market price of fish reduces drastically as supply dominates demand. As fish stocks are depleted because of IUU fishing, the cost of fishing increases and the price of fish on the market increases.

The intended purpose of subsidies in the fishing sector is to reduce the cost of fishing for the fishers to gain more profit to be able to support their businesses. This is evident in developing countries. However, subsidies introduced into the fisheries sector may also play a key role in financing IUU activities. By reducing the cost of fishing, the expected benefit is increased and the probability of engaging in IUU fishing is high. In other words, an incentive is created to cheat the system.

4.2 Cost of IUU Fishing

A report commissioned by The Pew Environment Group titled '*Costs of Illegal, Unreported and Unregulated (IUU) Fishing in EU Fisheries*' estimated the total cost of lost catches to EU member states from 2008-2020 as €10.7billion, approximately €825 million per year. The report further states that over 27,800 job opportunities in the fishing and processing industry will be lost.

In 2013, an international investigation with the support of the Government of Ghana was initiated to identify Ghana-flagged vessels that had been fishing illegally in third party states (Liberia, Cote D'Ivoire, Benin, etc.) from the period 2010-2013. The investigation revealed that about 30,000MT (in excess; US$45 million) of tuna had been imported by companies in the UK during the period. If these foreign companies are sent to court and found guilty, the local companies involved will suffer sanctions that will affect the economic activity of the country. Also, the reputation of the products in the EU market will be affected, thus affecting foreign exchange earnings.

In 2014, the EU, threatened to ban fish and fishery products from Ghana if they were caught fishing illegally, unreported and unregulated by Ghana-flagged vessels. The EU further stated that an ongoing dialogue process with the government will be terminated and the country would be issued with a red card, banning all fish and fishery products into the EU, even if a single vessel was caught IUU fishing. At the time, Ghana was of a yellow card/ pre-identification status.

Proceedings from the dialogue process stated that certain pressing conditions had to be met by Ghana to obtain a green card status. Among the conditions mentioned were:

i. the enhancement of the legislative framework on fisheries
ii. adoption of a national plan of action against IUU fishing
iii. adoption of a fisheries management plan and
iv. strengthening of the monitoring control and surveillance system

In the same year, the Government of Ghana, through the Ministry of Fisheries and Aquaculture Development, under the West Africa Regional Fisheries Program (WARFP), procured a Vessel Monitoring System (VMS), supplied and installed by Collecte Localisatione Satellites Group (CLS), France. The Fisheries Act 625 of 2002 and Fisheries Regulations 2010 were also amended to include stringent measures and sanctions to combat IUU fishing. Currently, a fisheries marine sector management plan has been prepared and yet to be published.

Other interventions included the formation of the Fisheries Enforcement Unit (FEU) comprising of the marine police, the Ghana Navy and personnel of the Monitoring, Control and Surveillance Division of the Fisheries Commission; and the Catch Certification Unit (CCU) whose duty is to verify all catch certification documents accompanying products to the European Community. The CCU has also developed a software that facilitates this process. These have all proven effective in the quest to eliminate IUU fishing in Ghana. In 2014 alone 150 vessels were arrested for infringing on laws as compared to 2013 where only 8 arrests were made (MOFAD, 2014) as can be seen in Table 1.

Table 1. Fines from the quayside inspection by FEU-MCSD of the Fisheries Commission

	2010	2011	2012	2013	2014
Total Number of Quayside inspections	621	738	944	1034	826
Total Number of vessels arrested for infringement	37	28	14	8	150
Fines (US$)			3,000,000	150,000	1,000,000

In late September, 2015 all restrictions on fish and fishery products imported into the EC from Ghana were lifted and Ghana attained a green card status. The pre-identification of Ghana by the EU highlighted the vulnerability of the Ghanaian industrial tuna fishery to external market forces. It is the responsibility of MOFAD to take proactive steps in combating IUU fishing to avoid such vulnerabilities in the future.

4.3 The Becker Model of Rational Criminality

One way of describing the rationality of IUU fishing is by the Gary Becker model of rational criminality. This model looks at a criminal as a rational individual, whose main aim is to maximize his own welfare, but through unlawful rather than lawful avenues. Welfare is measured as the monitory gain resulting from the violation (Becker, 1968).

The utility expected from committing an offense is defined as

$$E(U) = \theta U(B - f) + (1 - \theta)U(B)$$

that is;

U	=	utility
$E(U)$	=	expected utility
θ	=	probability of apprehension and conviction
B	=	income if undetected
f	=	monetary equivalent of the punishment
$(B - f)$	=	income if detected

This model explains that a risk neutral individual will continue to commit a crime so long as his expected benefits are greater than the cost he will incur if he was caught (Becker, 1968; Stiegler, 1971). It takes into account the cost involved in committing the crime as well as the probability of committing the crime. It also gives a relation between $(B - f)$ and B which could be used in management to determine what f should be in order to reduce $E(U)$. This is necessary in determining what the cost involved for deterring illegalities such as IUU fishing should or could be.

The Gary Becker Model of Rational Criminality explains that any activity that will increase the probability of apprehension (θ) reduces the probability of the crime to be committed. An input such as enforcement, which is meant to improve fisheries management, reduces the tendency of IUU fishing. In an effective fisheries management, sanctions that are linked with IUU fishing, in terms of monetary value must be deterring enough to be effective. Monetary sanctions such as fines must be greater than the benefits (B) of IUU fishing. By increasing the

probability of apprehension (θ) and the monetary sanction (f), the expected utility, $E(U)$, will be reduced, therefore, making IUU fishing unattractive.

However, the implementation of sustainable measures into a fishery, for the purpose of value addition may also increase the probability of committing IUU fishing as well as the income if undetected (B). For example, products from a certified fishery that has been issued with an ecolabel may have more value in a competitive market. As mentioned earlier, this is the result of sustainable products (tuna from longline fishery) being priced higher compared to products from an unsustainable fishery. A market incentive is created for competition within the fishery. The expected utility $E(U)$, from the sale of such a fishery is high.

From the Gary Becker Model of Rational Criminality, for a fishery management system to be highly effective, a disincentive must be put in place to make IUU fishing unattractive. This disincentive must increase the probability of apprehension (θ) and the monetary equivalent of the sanction, there reducing the expected utility $E(U)$. Monetary equivalents such as high fines reduce the income when detected $(B-f)$ and wipes market incentives that are created in certified fishery, therefore reducing the overall benefits from IUU fishing.

5 THE FSIHEREIS VALUE CHAIN

When tuna is landed in the fishing harbour in Ghana, it goes through a series of processes or activities before it finally gets to the consumer, which depends solely on the form and level of process preferred by the consumer. These processes at each stage add some value to the raw material that increases market value. The chain of processes is called a value chain (Porter, 1985). The price of the product on the market is determined by the consumer preference and demand. This also depends on the level within the value chain.

For a value chain to thrive the environment plays an important role by increasing its efficiency through supporting organisations such as institutions, associations and other businesses (Hellin & Meijer, 2006).

The value chain has five (5) main nexus that form the core/ primary functions. These are:

1) Inbound Logistics
2) Operations
3) Outbound Logistics
4) Marketing and Sales
5) Service (Porter, 1985)

From the analysis of a mapped value chain, information on the cost of doing business in a sector, as well the role of each industry player within the value chain may be obtained. The information gathered will contribute in informing policy makers in developing the right policies and regulatory frameworks to govern the sector without harming the cost of doing business itself but rather managing the environment and resource sustainably.

5.1 The Value Chain of Cod Fisheries in Iceland

Cod, a high value species in the Icelandic fisheries sector represents about 2/3 of the annual catch of demersal species (OECD). In 2014 cod contributed 237,561MT (22%) of the total catch of 1,075,634MT that was valued at ISK136 billion (US$1.05 billion) and 39% (US$410 million) of the total value.

The value chain of cod fisheries in Iceland is an advanced system with many levels of product development, having major markets in Europe, US and Asia (Gudmundsson *et al* , 2006). The success of the value chain of cod in Iceland depends mainly on the large VICs and the Small Medium Enterprises (SME's), which are specialised in fishing, producing and marketing (Statistics Iceland, 2015).

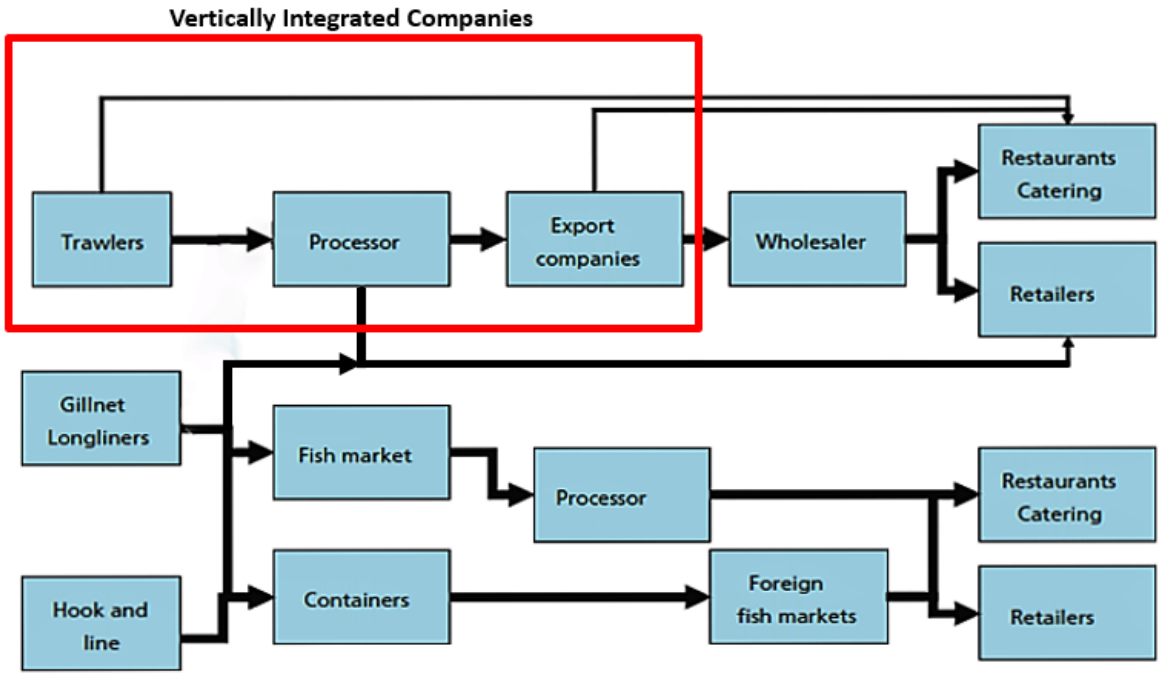

Figure 10. The Different Value Chain of Cod with respect to the kind of Fishery

Three main classes of vessels; trawlers, gill nets and long liners and inshore fleet (hook and line) supply cod unto the market for local and foreign consumption (Gudmundsson *et al*, 2006). The quality of the fish landed is a key factor that determines the value at the supply stage. The cod is bled at sea and supplied fresh on ice to the fish auction market. Well-bled cod is of higher quality and value and attracts a higher price on the market.

The ITQ provides an incentive for the regular supply of cod for both foreign and local market. It also creates an incentive for companies to invest in creating value through handling and processing along the value chain, since they are not allowed to simply catch more fish to increase their profits. The value created in the value chain is independent of volume of catch.

Large vertically integrated companies maximise costs by dominating most segments of the value chain, from harvesting through to processing and distribution to market. This eliminates competition and gives them control over markets

Value addition processes are key factors behind the success of the cod fishery in Iceland. The quality of the product determines its competitiveness on the international market. Support services ranging from engineering services to scientific research aim to improve the quality of cod and the price of the product.

An introduction of new technology and research-based findings has been the source of value addition in cod. The entire cod has a value-added components including fresh whole fish, fillets, dried fish, cosmetics, drugs and material for the fashion and design.

Value addition in cod fisheries starts from harvesting. In 2008, the Icelandic Minister of Fisheries and Agriculture in an address at a workshop on 'Responsible Fisheries Management in Iceland' mentioned that demands for products from sustainable fishery are becoming more vociferous and more frequent. As a result of fish buyers becoming more concerned about the sustainability of the fisheries from which they purchased their products. In April 2012, the Iceland Group PLC received MSC certification for the cod and haddock fisheries of Iceland. Other species under the Iceland Sustainable Fishery (ISF) that have attained MSC certifications include golden redfish, saithe, herring, and lumpfish, adding on ling in 2015. The decision to become a certified fishery was market driven, sending a message to clients that the Icelandic fisheries is sustainably manged

Harvesting of cod requires a bleeding process at sea which improves the quality of the fish, as possible blood stains are eliminated when it is bled fresh immediately. After bleeding, the cod is kept on ice in plastic fish boxes to maintain freshness. Fishers contact the fish markets in advance to give them information about their catch. The fish markets act as an intermediary between the supplier and the purchaser. Harvested cod sent to the fish markets gain more value through online fish auctions. However, the large vertically integrated companies sometimes depend on the fish markets for fresh cod to supplement the for their processing plants (Knutsson *et al*, 2008)

The processing of cod into various products helps to meet various preferences from various consumers and markets ((Knutsson *et al*, 2008; Gudmundsson *et al*, 2006). The UK, US and Asian markets prefer fresh cod products such as fresh whole cod, salted cod and cod fillets while dried cod heads are exported to Africa, specifically Nigeria.

Value generated on cod from Iceland remains within these companies and within Iceland as a result of the domination of large Icelandic vertically integrated companies. Profits generated in these companies are indirectly invested into the support services in Iceland which provide services that improve the value chain system of cod. Also, the variety of cod products gives it a competitve advantage in foreign markets.

Europe is at the top of the list of seafod exports from Iceland with seafood exports amounting to ISK 218billion (~US$ 1.7billion) out of a total marine product export of value of ISK 272 billion (~US$ 2.1billion) in 2013. That is approximately 80% of the value of all marine products exports. Out of a total marine product export of 786,000MT, 121,000MT was contributed by cod at a value of ISK 88billion (~US$ 681million), that 32% of the total export. In 2013, cod exports were 57% of the total value of all demersal species (ISK 155billion ~ US$ 1.1billion) which was an increase of ISK 5billion (~US$ 39million) from 2012 as shown in Figure 11.

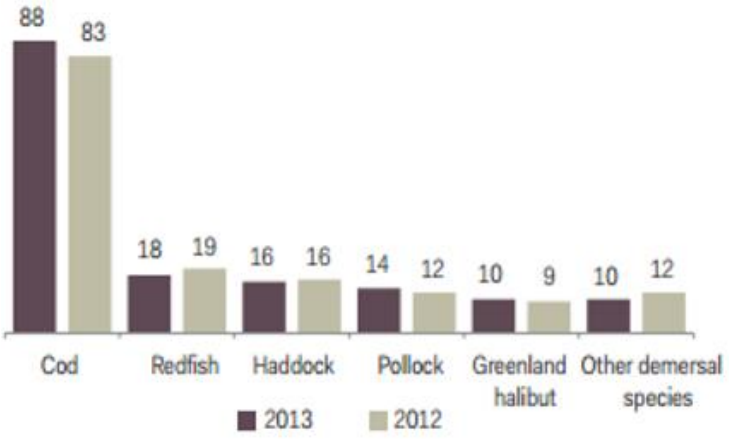

Figure 11. Comparison between the values of demersal species for the period 2012-2013.

The UK is the largest market for cod export to Europe. In 2013, cod accounted for 24.4% of marine food exports from Iceland to the UK (Table 2).

Table 2. Percentage of cod export in total marine exports to Europe and the US

Cod	ISK (million)	% of total
UK	21,387	24.4
France	13,838	15.8
Spain	13,052	14.9
USA	6,996	8.0

The value of cod to the economy is important and much attention and effort over the years has been invested into maintaining the quality of the products and to improve upon its value.

5.2 The Value Chain of the Tuna Fisheries in Ghana

Tuna, a high value species, dominates the fish processing industry in Ghana. Products from tuna include sashimi, canned tuna flakes/ chunks in oil/brine, loins, and many other forms. The value chain in the tuna species has several paths and the value of the specific product varies with the level of value addition.

The vertically integrated nature of the processing companies in Ghana eliminates the activities of middlemen from the value chain, directing all profits generated to the parent company. Other activities in the value chain that could have been taken up in the value chain by middlemen have been replaced by fish importers and local fish processors and fish importers who fall within the wholesale and retail market (Figure 12).

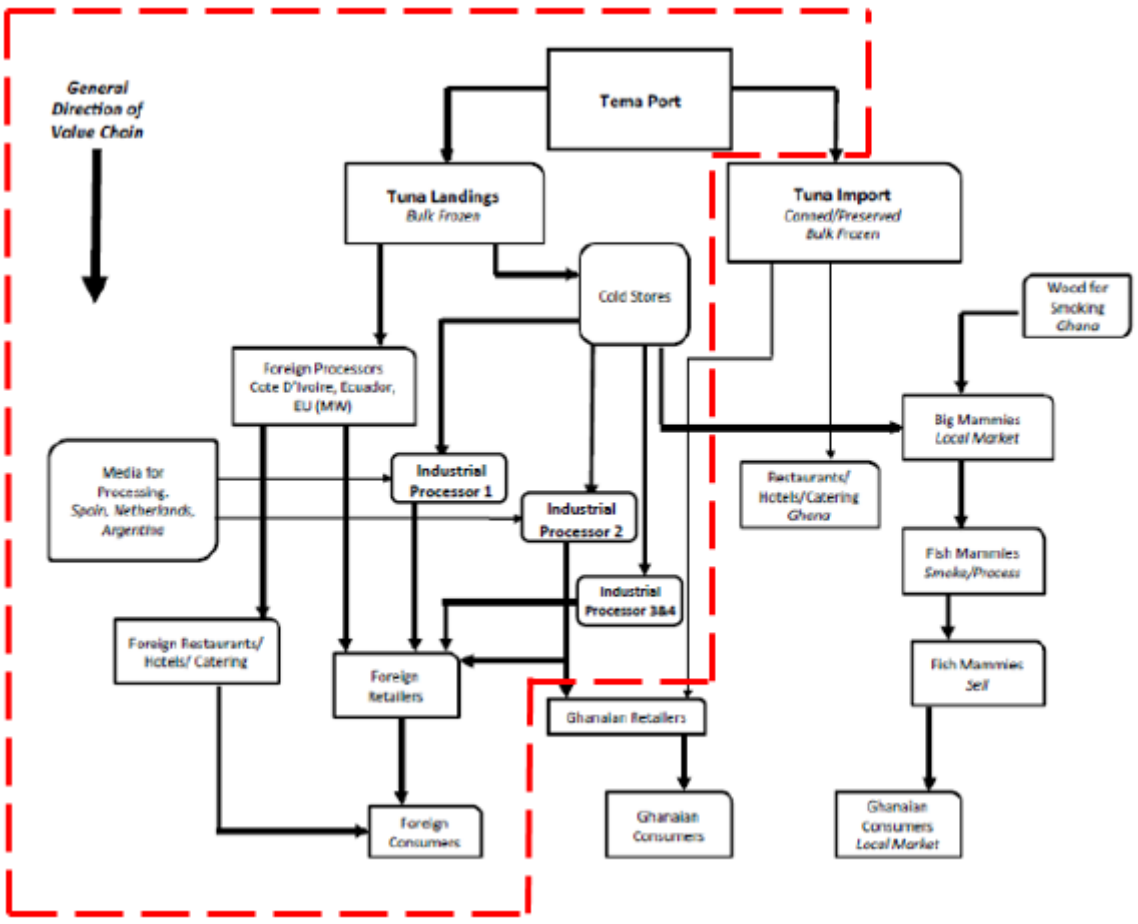

Figure 12. Map of the Value Chain of Tuna in Ghana. The demarcated area is the value chain of tuna processed for export

In Ghana, tuna species are landed at the Tema harbour where it is inspected by the authorities before transport to cold storage facilities. The estimated weight of the tuna is taken onboard the vessel and communicated to the authorities. The tuna is transported in scions on specific trucks to the cold storage facilities of processing companies that are located about 5-10 minutes away from the fishing harbour. The tuna is stored in temperatures below -25^{o}C to maintain freshness (FAO, 2006).

Many of the vessels that land tuna at the harbour have an agreement or have been contracted by the processing companies to supply them with whole frozen tuna. These vessels are normally foreign boats originating from Belize, France, and Spain. Other vessels are owned by vertically integrated foreign companies (e.g. Korea) with operations in Ghana due to partnership agreements with some Ghanaian fishing companies. Despite the companies being vertically integrated, they are operated as individual entities. The price of tuna is determined by the buyer and supplier through negotiation. Tuna prices vary with grade, species, and season. However, the high purchasing power of the processing companies give them an advantage over the suppliers.

Before the processor makes a purchase of tuna, the fishing company is contacted weekly to obtain information about the berthing schedule and the estimated catches of the species. Negotiations for the price of the tuna commences when the supplier meets the demand of the processor. When the price is set, a due diligence is carried out by the processor on the consignment. This is done with a checklist from the processor and includes a request for

logbook data, ECCC (that is, if it is a foreign vessel, since local vessels present a landing permit which includes information about the catch) and other accompanying documents. In the case where the fishing company is unable to provide the necessary documents, a form is sent to them to be filled. This form acts as a guarantee for the consignment. This is to ensure that the fish is caught legally.

Prior to discharge after arrival at port, the Ghana Standards Authority (GSA) boards the vessels to do the first inspection. All vessels are inspected by the GSA. The Quality Assurance team from the processing company then boards the fishing vessel to do a quality check as well as take samples for analysis. If the samples pass the analysis, the fish is discharged. The fishing company is responsible for transporting the tuna to the premises of the processor. The characteristics of the transportation are determined by and based on the standards of the processing company. The fish does not belong to the processor until it is sorted and re-weighed and in the presence of a representative of the fishing company at the premises of the processor. The graded fish is weighed by size, weight, quality, etc. The accepted quantity is stored in temperatures below -25 degrees Celsius to maintain freshness. The rejected fish is returned to the fishing company and sold on the local market. The value of the product is affected by the quality of the harvested fish.

Value added at the harvesting stage is attributed to the method of fishing. Though the raw product remains unchanged at this stage the end-product generates value. For example, value generated on tuna species caught by bait-boats (pole and line) and long-liners is higher than the value generated on fish of the same species caught by purse seiners (FAO, 2006; OPRT, 2004). The method of fishing is an indirect input of value addition to the resource. Long-liners and bait-boats are selective in their operations and therefore promote sustainability. The cost of fishing using sustainable methods is low as the demand for pole and line fish in the UK, for example is high (Stone *et al*, 2009). The price change here is based on the quality. This demonstrates that the value of fish caught in a sustainable manner may attract a higher price compared to unsustainable methods such as purse seining.

The tuna is processed and packaged into cans or pouches. For certain markets, example Asia, the tuna is sorted by species or graded into sizes, cleaned, or sliced into loins, tuna blocks or sashimi. About 75% of all tuna landed are processed into canned tuna and exported to Europe (O'Neil 2013). The remaining 25% is divided between the Asian and local Ghanaian markets (FSSD, unpublished). Tuna is processed into different products for different markets (tuna flakes in oil/ brine and tuna chunks in oil/brine) and packaged into cans ranging from 80g – 640g/unit (O'Neil 2013). Some brands of tuna produced for the foreign markets include Mareblu (Italian), John West (UK) and Petit Navire (France) which dominate specific competitive markets. These markets are at the wholesale end of the value chain. By-products from the processing, such as the head, tail, offal and bones are further processed into fish meal used by local animal feed producers.

Prior to the exportation of tuna and tuna products to Europe, an ECCC must be verified and validated by the competent authority. A reapplication and resubmission must be made to the Fisheries Commission, resulting in a re-verification. This may affect the value of the product and thus, the price on the market.

Factors such as the availability of the tuna, size of can, type of fishing method may also affect the price. The method of fishing indirectly affects the overall cost which is passed on from the producer through to wholesaler/retailer and finally to the consumer.

The tuna processing companies are market driven to satisfy the demand. The consumer is willing to pay the price for a can of tuna irrespective of the processes it has undergone. However, in some cases consumer purchase may depend on specific preferences. For example, in Ghana, some of the canned tuna are species specific. Market surveys indicate willingness to pay a higher price for some species. In this case the client is willing to pay more for the product. The value of the product therefore appreciates in the value based on consumer preference.

The quality of the catch is connected to the method of fishing. Tuna that is caught in a sustainable manner is of better quality and of higher value. Yellowfin and bigeye caught by foreign longline vessels attract a higher price that affects the product price on the market (OPRT, 2004).

IUU fishing activity affects the flow of trade of fish and fishery products (FAO, 2010). For tuna species, trade barriers are created through the extent of scrutiny which affects the value and pricing of tuna and tuna products. These barriers influence the product of tuna and may even prevent it from reaching the international market, creating a loss in value from the total production. For example, several tuna consignments that had been shipped by a processor in Ghana to the EU in 2013 were found to be produced from IUU fish and were detained and confiscated by the inspection team in the UK till 2015 when they were sent back to Ghana. As a measure of sanction, the consignments were not to be sold but given out on charity basis. The value of the entire consignment was more than US$3million.

In January 2010, the EU IUU Fishing Regulation was enacted (European Commission, 2008). The regulations ensured that the individual or company importing fish or fishery products into the EU must ascertain through a due diligence process that the country of origin of the fish or fishery product has effective and enforced regulations and laws governing its fishery towards sustainability of its marine resources. According to the European Commission Regulation (2008) EU member states may ban any fish import if they;

- are not accompanied by a catch certificate;
- were caught by a vessel that has been found to engage in IUU fishing;
- were caught by a vessel included in the EU IUU fishing list; or
- were caught by a vessel flying the flag of a non-cooperating third country.

Since the establishment of the EU IUU Regulation in 2008 and the banning of fish and fishery products from Ghana into the EU in 2013, the exportation of tuna and tuna products to the EU have undergone scrutiny by both the competent authority in Ghana and the EU. In some cases, products, for example in the UK, have been detained by port health authorities even after they have been verified and validated by the Ghanaian competent authority. The cost incurred by the delay of such products is borne by the exporter. Also, after the ban in 2013, the integrity and value of tuna and tuna products from Ghana was affected on the international market.

6 ECOLABELLING

The Global Ecolabelling Network, 2004, defines an ecolabel as “a label which identifies overall environmental preference of a product (i.e. good or service) within a product category based on life cycle considerations” (GEN, 2004). Eco-labelling is a way of giving the consumer a say in how a resource is managed. It is a representative of part of sustainable management interventions from the consumer’s perspective.

In the fisheries sector, through eco-labelling, the consumer has the impact of controlling the market for the product by demanding sustainably harvested fish over non-sustainably fish products. If the probability preference for a consumer to purchase eco-labelled products is higher, a price premium incentive is generated over non-ecolabelled products. This will motivate stakeholders within the value to self-sustainably manage the fishery by demanding products that meet similar qualifications (Gudmundsson & Wessels, 2000). This requries that an effective management system is in place since without such a system a higher price might actually increase fishing effort and hence reduce the sustainability of the fishery.

Over the years, ecolabelling has proven to be an effective method of certifying both fishery and forestry products towards sustainable management (Cashore et al, 2003; Teisl et al, 2002; Roheim, 2008). The Marine Stewardship Council has proven to be a leading organisation amongst many global competitiors in labelling of seafood products based on number of fisheries certified, logo presence in the marketplace, etc (Parkes, et al., 2010).

7 ANALYSIS

Prior to the formation of the FEU and the installation of the VMS at the MCSD of the Fisheries Commission of Ghana, Ghana was lacking in monitoring of its EEZ with respect to IUU fishing activity. It took the imposition of a ban in 2013 by the EU on the importation fish and fishery products into EU to get Ghana to strengthen it governance and join the fight against IUU fishing. Since then, improvement has been seen in Ghana's monitoring and surveillance of its fisheries. The number of apprehensions from infringements of regulations increased from 8 in 2013 to 24 in 2014. Note that this increment can be attributed to the strengthening of the MCSD.

Transparency International, a non-governmental organisation whose focus is on the monitoring and publicizing corporate and political corruption in international development, in a 2015 report (Transparency International, 2015) ranked Ghana as the second out of 36 countries, as the most corrupt country in Africa. Having been ranked with this position, the tendency of individuals to be corrupt is high, especially in the fisheries sector where bribery and corruption could pose a huge problem for management. The failure on the part government to efficaciously enforce fishing regulations is closely associated with political affiliations and the lack of political will (Bondaroff *et al*, 2015). The fear of the loss of political power of a reigning government through the loss of votes from the fishers due to the imposition of a sanction or the enforcement of a stringent measure in a regulation may prevent government from executing its mandate in fisheries governance. Most often, less stringent sanctions are applied for grievous offences in fisheries.

Again, the failure or inability of government effectively enforce regulations is essentially a failure of fisheries staff to carry out duties when handling non-compliance issues. Many cases of non-compliance are overlooked or not given the necessary attention they require to be prevented or deterred. In the recent investigation into IUU fishing by Ghana-flagged vessels, suspicion was raised that observers placed on board tuna vessels were compromised and the reports they produced were biased. Logbook data presented by the observers after fishing voyages were suspected to be a copy of what had been handed over to them by the captains of the fishing vessels. If there were mistakes or misreporting in the logbooks of the captains, it was transferred into the report of the observers. In some instances, it was alleged that the observers had collected some form of bribe to record false data. Again, a suspicion of what could the result of bribery and corruption, specifically, in a developing country where the minimum daily wage is GHS7.00 (~US$1.80) compared to a developed country like Iceland whose minimum daily wage is about ISK9,200 (~US$73.00). It is possible for an incentive to

be created in an economy like Ghana where the daily minimum wage is low. The extent of this is limitless and can affect officials of government in influential positions. However, as mentioned above, the concerns raised are alleged but still give room for doubt. Bribery can be deterred if it is made unattractive (Besley & McLaren, 1993). Therefore, to deter bribery in enforcement of fisheries regulations, it is important that observers and enforcement officer are incentivised beyond any form attractive token that may have offered them during their operations.

The cost of operation of most of these industrial fishing and tuna processing companies exceeds the sanctions of fines when or if the commit a crime. Therefore, it is more profitable to commit an illegal act, whether it is processing IUU fish and committing IUU fishing, than to pay a fine, thus making the intended effect of a fine to be futile. Low fines are considered as cost of operations and have deterring effect on IUU fishing (Beke & Blomeyer, 2014; MRAG, 2005). Usually, the ability of these large companies allow them to pay fines quickly in order to resume operations. Van Fossen (2012) states that a Vanuatu-flagged vessel with Taiwanese ownership which had been arrested for IUU fishing in the Federated states of Micronesia in October 2007 was immediately released after its owners paid a fine. This is a vivid example of an affordable and undeterrable fine.

In Ghana, the Fisheries (Amendment) Act 880 of 2014, an Act to ammend the current Fisheries Act 625 of 2002, states in Section 88 subsection (3);

> *A fish processing establishment which exports fish and fishery products and undertakes any of the activities identified as Illegal, Unreported and Unregulated fishing under subsection (1) commits an offence and is liable on summary conviction*
> *a) to a fine of not less than one million United States Dollars and not more than two' million United States Dollars for a first-time contravention; and*
> *b) for subsequent contraventions, to a fine of not less than two million United States Dollars or five times the value of the export, whichever is greater."*

Prior to this ammendment, ten companies from the tuna industry, both processors and fishers, had been fined a total of 3.1 million US dollars by the Fisheries Commission for engaging directly or indirectly in IUU activity (Fisheries Commission, 2014). The companies comprised of both locally owned as well as large vertically integrated companies with foreign origins. At this stage, this is a typical example of how fines could fail.

Firstly, considering the amount of profit that had been generated from IUU activity by the large vertically intergrated companies a period of years, a percentage, whether large or not will be ineffective considering the severity of the crime and the cost that they had to pay because these profits would have been turned over to generate excess profits from the same illegal activity. Also, most of these illegal fishing activities had taken place at the expense of the economy of third party states. Parent companies of vertically intergrated companies may also step in to bail their subsidaries out in their bid to serve their own interest. A fine of this nature incentivices these kind of companies to continue with their IUU fishing activities, so far as they can afford it. Oceana reports that, “Penalties paid within the European community averaged between 1.0 and 2.5% of the value of IUU landings, effectively a cost of doing business rather than a deterrent” (Tinch, *et al*, 2008).

Secondly, the cost to the local companies, irrespective of the percentage they had to pay, would be more detrimental as compared to the foreign companies. This is because the cost of doing

business in a developing country is high and any indirect or unexpected cost will affect the cost of doing business. It was revealed through discussions with some officials from the local companies that the imposition of the fines affected business to the extent that they feared closure.

Placing all of these companies in the category of paying fines will have a negative impact on local companies. This may lead to descrimination and an incompetitve market will be created (Beke & Blomeyer, 2014) between the local and foreign fishing companies, placing the local companies at a disadvantage. Also, the larger companies will take advatage by monopolising the industry such that they will have a control over the price of the raw product, having knowledge that the smaller companies have no choice than to sell their fish to them.

Crimininologist, Dr. Jay Albanese says, "severity of the penalty associated with apprehension must outweigh the potential gain of the corrupt action" (Albanese, 2011). However, this is debatable in the case of IUU fishing. With the introduction of stringent measures of combating IUU fishing in Ghana, the Fisheries (Ammendment) Act 880 of 2014 seeks to impose fines that are deterring. The argument here, from an economic perspective, is that if the tuna fishing and processing companies are to pay fines that are above their revenue generation capacity or operation cost, then, the tendency to produce at normal capacity will be low, resulting in higher cost of operation and a decrease in foreign exchange inflow. This is because the fishing and processing in Ghana will be unable to compete on the international markets and may have to drop the prices of their products, thereby reducing their profits.

In addition, for the tuna companies in Ghana to balance operational cost with the cost of IUU fishing from the payments of fines, workers might have to be laid-off so as to minimise costs. About 3000 Ghanaians are emloyed directly by the tuna industry. This number will drop significantly if workers in ths industry are to be laid-off.

Improving upon the quality of a catch may have some positive effect on the pricing through indirect value addition. Sustainable fishing methods have proven to affect the pricing of Sri Lankan tuna to the UK market (FAO 2005). Gestsson *et al* (2010) emphasises that fresh Sri Lankan yellowfin tuna exported to the UK attracts a high price because of some value addition. Fresh yellowfin tuna from Sri Lankan tuna has about 50% added value when exported to the UK compared to Ghanaian average price of Ghanaian tuna (O'Neil, 2013). The added value in Sri Lankan tuna might even be triple that of the Ghanaian canned tuna products on the UK market. Large long line vessels in Sri Lanka target tuna for the export market (Dissanayake, 2005; Amaralal, 2010). With the promotion of sustainable fisheries, the CBI of Netherlands attributes the added value of Sri Lankan tuna to the method of fishing. It is promoted in the UK markets as sustainably caught and there attracts a higher value in the UK markets. Therefore, though Ghanaian tuna ends up in cans on the UK market, to attract a high price value addition, the harvesting method must be seen to be sustainable.

The placing of ecolabels on fish and fishery products seeks to promote a fishery by addressing the issue of sustainability. Through discussions with Ghanaian tuna processors, it was inferred that purchasers from the EU were willing to pay about 10% more for a box of canned tuna caught with pole than a box of the product caught with a purse seine. In some instances, the purchasers were species specific as well as fishing method specific. This gives evidence that product information has an influence on consumer purchase and value flows through the value chain.

Ecolabels in a fishery allow the consumer to have a voice on how a fishery is managed sustainably (Gudmundsson & Wessels, , 2000). Teisl *et al* (2001) in a study to prove that the dolphin-safe label influenced consumer behaviour indicated that the label did not have an instantaneous effect on canned tuna products in the US, but with time the purchase of the product by the consumer was on the bases of morality and ideology. Also, policy initiatives by government and sensitization from non-profit making organisation through media channels to protect dolphins by improving tuna fishing methods targeted at making the tuna fishing sustainable affected consumer purchase.

If Ghana is to enact policies that are aimed at improving the quality of tuna that is landed through a sustainable fishery, some value may be added to the catch. One such policy initiative could be the implementation of an ecolabel in the tuna fishery. The procedure of certifying a fishery to have an ecolabel introduced will contribute to the sustainability of the fishery. For a fishery to be certified and issued with an ecolabel, it is important that there is compliance in the fishery. There should be collaborative effort from both industry and competent authority to ensure that the fishery becomes sustainable. The management system must also be up to standard in managing the fishery sustainably. This will result in mandates for fishing vessels, both foreign and local, to use methods of fishing that are in line with the certification for an ecolabel in order to land their catch, thereby creating an incentive to deter IUU fishing by Ghanaian flagged vessels.

The consequence of tuna products that are imported into the EU from Ghana and found to be connected to IUU fishing activity will have damaging effects on Ghana's tuna industry and affect economic activity. An ecolabel, however, could prevent suspicion in foreign market, about Ghanaian fleet being involved in IUU activity by assigning qualities to the product that attribute it to sustainable fisheries and sustainable management.

8 CONCLUSION AND RECOMMENDATIONS

A ban on tuna from Ghana by the EU would have detrimental effects, both social and economic. The value created in the entire fisheries sector is dependent on the tuna industry, therefore much attention and investments must be made into the tuna industry to make it a thriving industry in Ghana.

Ghana's governance in fisheries is weak and has contributed to the level of existing non-compliance. To avoid any form of IUU activity it is important that management structures are put in place, especially in the area of MCS. It is the responsibility of the competent authority to ensure that the regulations are enforced to prevent any form illegality or non-compliance, especially in the tuna sector.

High costs of fisheries enforcement in developing countries is a challenge which is not exceptional to Ghana and will limit the extent to which Ghana will be able to strengthen the enforcement of its fisheries regulations. The fisheries management system in Ghana will continue to be ineffective until it is aligned with the existing nature of non-compliances. The idea behind the committing of illegalities must be understood thoroughly. The onus, therefore, lies on the competent authority to communicate to the fishers and stakeholders that for a management system to be successful it is a collective responsibility.

It is important that collaborative effort is seen as key element in the management of the fisheries sector in Ghana. To have an effective management system it will take efforts from both the competent authority and the fishing industry, bringing together all stakeholders in the fisheries

sector. Through the collaborative effort of management, a sense of responsibility and ownership is created amongst all the parties. This awareness reduces the cost of enforcement. It is necessary that alternative approaches to fisheries management are considered.

This study emphasises that not only does IUU fishing activity thrive as a result of high cost of enforcement but also as a result of failure on the will of governments to enforce them, lack of knowledge on the part of enforcement officials and the fishing industry and bribery and corruption. In Ghana, this can be avoided if a third party is given have auditing responsibility over the management system. One of such approaches is the implementation of an ecolabel that will assist in eliminating weaknesses in the management system through the certification of Ghana's tuna fishery.

It is important that, Ghana, considers the implementation of an ecolabel in its tuna fishery sector not only to fight IUU fishing, but to create an incentive for sustainable fishery management structures. This will facilitate the processes involved in the value chain, including trade protocols such as ECCC verification prior to exportation. The implementation of an ecolabel into Ghana's tuna sector is feasible, taking into consideration the small size of the tuna sector compared to the entire fisheries sector of Ghana. The tuna industry must be engaged through workshops, seminars and other awareness programmes on the importance and value of an ecolabel.

Finally, the implementation of an ecolabel will require further research and study into Ghana's tuna sector and therefore, it will be essential if a decision is made by government, with contribution from stakeholders in the tuna industry on the right kind of ecolabel that will serve in Ghana's interest. Based on this decision an investment plan will be required as a guide to facilitate the investment into the upgrading of management infrastructure as well as investments into education and awareness on the purpose, functions and benefits (local and international) of an ecolabel Ghana's tuna sector.

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