

## The performance of tuna processing fishery sector to sustainable fish trade and food security in Ghana

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### *Abstract*

The paper presents an analysis of the performance of the tuna processing fishery sector of Ghana in order to derive the maximum benefits for the Ghanaian economy. Interviews and document analysis were carried out with approved tuna processing firms, government institutions and statistical service of the European Union. Results showed that the Ghanaian tuna processing industry is mainly supplied with raw material coming from national vessels, both purse seiners and pole and line. This raw material is only enough to have the plants operating at 60 % of their maximum capacity. There are a total of 6, 500 people employed in the tuna fish chain. A total of 58, 000 tonnes of tuna is canned annually. The market destinations are Europe, National and Ivory Coast, ranked in a descending order according to the tonnage. In conclusion, Ghana has huge potential to increase tuna fish export and can generate more economic and social benefits, such as food security, employment, foreign exchange, income and poverty reduction to the Ghanaian economy.

**Keywords:** fish, fisheries, Ghana, management, processing, trade, tuna

### **1. Introduction**

Fish consumption plays a key role in the supply of animal protein and micronutrients needs of humans globally. With the rising risk of contracting various diseases associated with meat consumption, the dependency on fish keep increasing. World fish consumption and utilisation is growing with corresponding growth in world population. The world population is expected to hit over 9 billion by the year 2050. About 2 billion people worldwide would be experiencing hunger by 2050. The right to food is

a universal human right, but currently, over 800 million people suffer from hunger [1]. Demand for fish is expected to grow given escalating animal protein demands in developing countries and the rapidly increasing human population [2] [3].

The world's annual per capita consumption of fish has increased from 13 kg to 19 kg between 2000 and 2012, respectively. Fish consumption trends in developing countries are based on locally and seasonally available products, with supply driving the fish chain [1]. Developing countries like Ghana consume over 80 % of fish produced as food while the remaining are used for non-food purposes such as preparing feed for poultry, aquaculture and livestock, fish oils. Fish consumption represents 60 % of animal protein intake by Ghanaians accounting for 22.4 % of household food expenditures [4]. The annual per capita consumption of fish in Ghana is 25 kg which is higher than the world and Africa average of 19 kg and 10 kg, respectively [1] [5].

Fish continues to be one of the most-traded food commodities worldwide. It is especially important for developing countries, worth half the total value of their traded commodities. Fish trading represents about 10 % of total agricultural exports and 1 % of world merchandise trade in value terms. In the last ten years, between 55 and 60 million tonnes (live weight) of fish and fishery products have been exported at the world level [1]. The high demand for fish at the world market has resulted in various methods of exploitation of fish leading to depletion of fish resources in the wild, leaving few fishes for small-scale and artisanal fishers to generate income and subsistence, as seen in many African countries [6]. Aquaculture is seen as the alternative to reduce the fishing pressure on capture fisheries.

Fish production (from marine, inland and aquaculture) in Ghana has been fluctuating with annual average of 428, 000 tonnes (Table 1) [7]. The tuna fishery is one of the important fisheries sectors of Ghana. There are about thirty registered tuna vessels in Ghana operating with average annual tuna production of about 74, 000 tonnes [8]. The tuna fishing vessels catch mainly yellowfin tuna (*Thunnus albacares*), skipjack tuna (*Katsuwonus pelamis*) and bigeye tuna (*Thunnus obesus*) which are pelagic and migratory species. Recent assessments undertaken by the International Commission for the Conservation of Atlantic Tunas (ICCAT) indicate that, yellowfin and bigeye tuna resources in the Atlantic are being optimally exploited while skipjack tuna is underexploited [9]. Most tuna vessels are operated on joint-venture basis, with Ghanaian owners having at least 50 % of the shares, as required by the Fisheries Act 625 of 2002.

Fish trade is crucial to developing countries such as Ghana. Ghana is a major exporter of fish and one of the countries in the West African sub-region that export fish and fishery products to the European Union (EU). As an economic policy, the government allows export of fish from Ghana in order to ensure that the

country derives maximum benefits from its fisheries. Ghana fish export has been fluctuating around 44, 000 and 63, 000 tonnes value at US\$ 158 million and US\$ 209 million during the last 5 years [10]. Exports are mostly derived from the industrial fisheries; very little fish caught by small-scale fisheries is exported. The types and species of fish and fishery products exported are: frozen tuna, canned tuna (into tuna flakes, tuna chunks and tuna mash), dried or smoked fish and other assorted demersal fish such as cuttlefish, crabs and lobsters and other small pelagic including crustaceans, cephalopods [9]. Fish and fishery products are Ghana’s most important non-traditional exports accounting for over 50 % of earnings from non-traditional exports and increasing each year [4] [11].

**Table 1: Ghana Fish Production from 2008-2012 (tonnes) (Marine, Inland and Aquaculture)**

<b>Fleet/Year</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
Artisanal	254,133	226,755	203,000	228,000	213,452
Inshore	6,140	12,048	9,823	9,337	10,482
Industrial	19,594	20,837	18,856	19,762	19,763
<b>Tuna</b>	<b>64,000</b>	<b>66,470</b>	<b>77,876</b>	<b>69,446</b>	<b>90,000</b>
Inland (Wild)	87,000	70,796	83,126	95,353	95,791
Aquaculture	5,594	7,154	10,000	19,092	27,450
<b>Total</b>	<b>436,461</b>	<b>404,061</b>	<b>402,684</b>	<b>440,990</b>	<b>456,938</b>

**Source: Fisheries Commission/MoFAD, Ghana (2013)**

Tuna contributes to the largest share of Ghana’s exported fishery products (averagely 50, 000 tonnes annually). Tuna processing offers considerable benefits in terms of employment, income, food security, Gross Domestic Product and other socio-economic benefits to the Ghanaian economy. The objective of this paper is to analyse the performance of Ghana’s tuna processing fishery sector in order to enhance fish trade and food security benefits to the Ghanaian economy and sustainable management of fisheries resources of Ghana.

## **2. Materials and Methods**

### **2.1. Data collection**

#### *Document analysis*

A number of publications produced by organisations and individuals were analysed as secondary data sources (i.e. the International Commission for the Conservation of Atlantic Tunas, Ghana Standards Authority, Ghana Statistical Service, Ministry of Trade and Industry, Ministry of Fisheries and Aquaculture Development, Fisheries Commission, West African Regional Fisheries Programme, Custom Excise and Preventive Service, Food and Agricultural Organization). Documents generated in the field were also analysed (i.e., field notes and photographs).

#### *Interview with tuna processing companies, tuna associations and institutions*

Interviews were conducted with personnel in approved tuna processing companies (Pioneer Food Cannery (PFC), Cosmo Seafoods, Myroc and Ichiban Seafoods). All the approved tuna processing companies are located in Tema, Ghana which is one of the major port for landing tuna and supply products to both the local and international markets. Personnel interviewed included: quality assurance managers, operations managers, health and safety managers, environmental managers, production managers, human resources managers, logistics managers, laboratory technicians and Hazard Analysis Critical Control Point (HACCP) coordinators. Interviews were also undertaken with Ghana Tuna Association (GTA) and the Competent Authority (CA). The Competent Authority is currently the Fish Control and Export Project Department under the Fish Inspection Department of Ghana Standards Authority that has been selected by the European Union as the competent body dealing with fish exports from approved establishments.

#### *Eurostat*

Data on fish export, import, prices, value addition and international trade were retrieved from Eurostat (the statistical office of the European Union) and analysed for the period 2008-2012. Data from Eurostat were used since Ghana exports over 60 % of its tuna products to Europe.

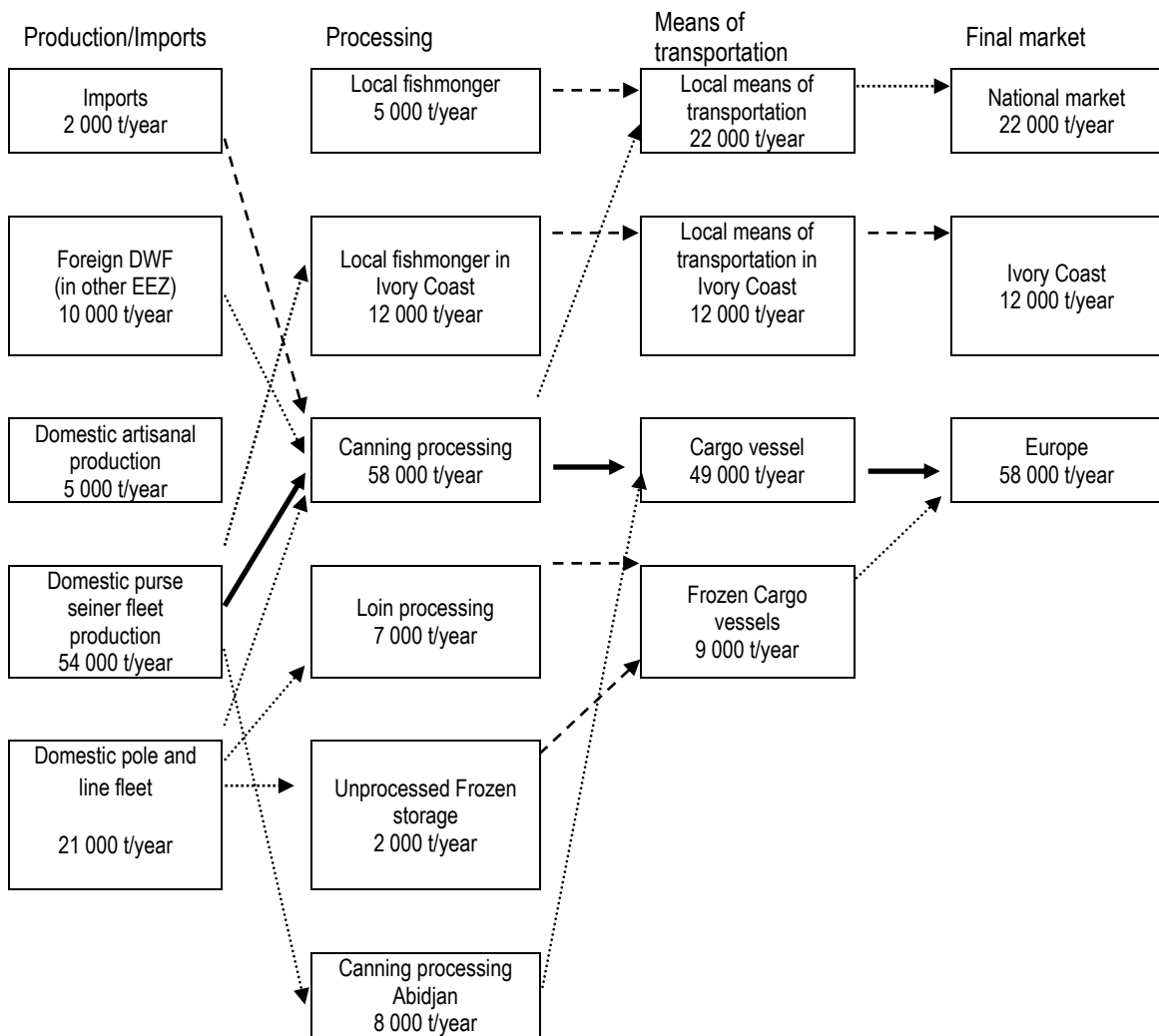
### **2.2. Data Analysis**

Data was processed and relevant tables and graphs produced using Statistical Package for Social Scientist (SPSS). Results were presented in both tables and figures.

### 3. Results

#### 3.1. Processing and Trade Patterns

Tuna raw material and product flows (live weight) are shown in Fig. 1. The raw material is mainly supplied with raw material coming from national vessels, both purse seiners and pole and line. A sizeable supply also come from Foreign Distant Water Fleets (10, 000 tonnes per year) and domestic artisanal production (5, 000 tonnes per year). Processing by canning is 58, 000 tonnes per year (highest) while processing by local fishmonger is 5, 000 tonnes per year (the lowest). The final markets are Europe, national and regional, ranked in descending order according to the tonnage.



**Figure 1: Tuna raw material and product flows (live weight)**

### 3.2. Employment and Actors in tuna processing

Employment in the Tuna fish chain totals 6, 500 people that can be split between:

- Fleet: 1100
- Processing: 3200
- Upstream: 1500 and Downstream: 700

Tuna processing plants generally have more women (80%) than men (15%). For instance, Cosmo Seafoods Limited has a total of about 600 workers at full operation with about 80% females and 20% males. Pioneer Food Cannery (PFC) also offers direct employment to more than 1, 800 Ghanaians while Myroc has 800 workers.

### 3.3. Performance of the processing industry and competition

Tables 2 and 3 show the quantity (tonnes) and value (1000 EUR) of tuna supplied by countries to the EU market between 2008 and 2012. The quantity of tuna supplied by Ghana within the period decreased from 29,437 to 26,107 tonnes. A similar trend is observed by all the other countries (or blocks). This is clearly an indication of depleting stocks. The value (1000 EUR) of fish supplied by Ghana increased from 86, 860 to 105, 351. The price per kg of tuna (Fig. 2) increased from EUR 2.9 to EUR 4.00 within the same period.

**Table 1: Top 10 EU tuna can suppliers in quantity (tonnes)**

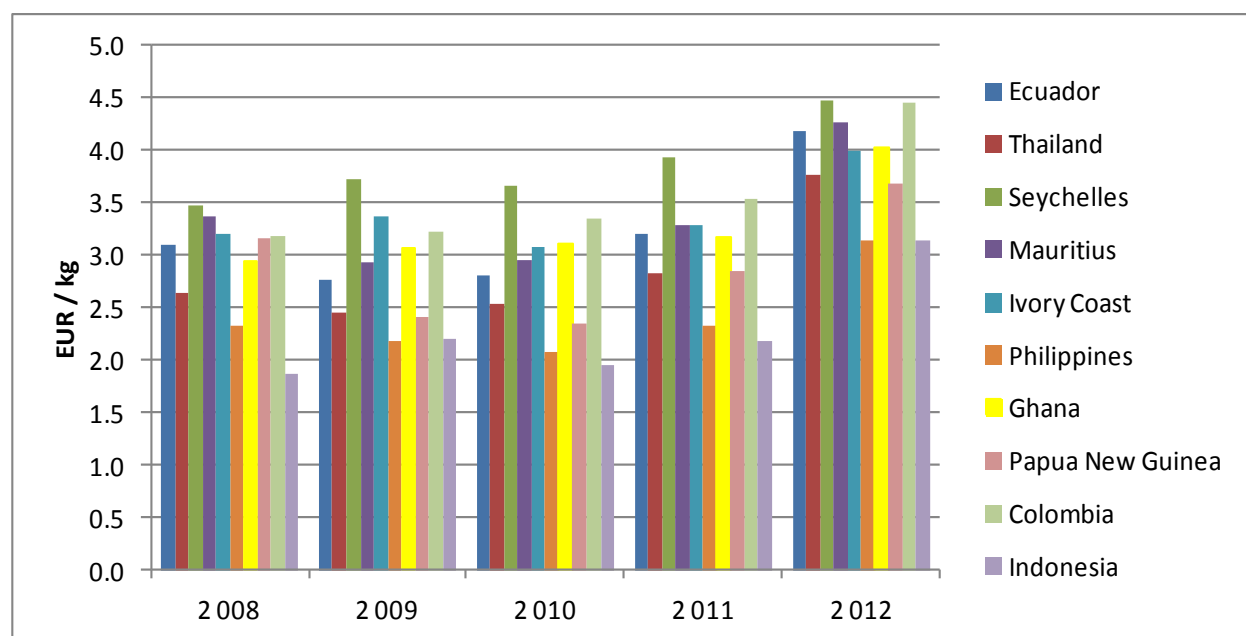
	2 008	2 009	2 010	2 011	2 012
<b>Ecuador</b> (GSP) (ANDEAN)	93 631	63 721	62 024	71 452	73 636
<b>Thailand</b> (GSP) (ASEAN)	63 001	62 231	66 177	73 089	45 430
<b>Mauritius</b> (GSP) (ACP)	37 895	35 431	44 166	43 868	46 846
<b>Seychelles</b> (GSP) (ACP)	42 788	42 318	40 984	43 548	43 735
<b>Philippines</b> (GSP) (ASEAN)	54 450	54 044	45 405	35 609	30 892
<b>Ivory Coast</b> (GSP) (ACP)	37 745	31 471	26 249	25 726	34 616
<b>Ghana</b> (GSP) (ACP)	29 437	26 471	27 387	25 853	26 107
<b>Papua New Guinea</b> (GSP) (ACP)	8 739	14 626	15 898	15 632	19 534
<b>Colombia</b> (GSP) (ANDEAN)	17 859	12 746	11 403	13 281	12 218
<b>Indonesia</b> (GSP) (ASEAN)	9 804	11 056	9 019	12 989	14 170

Source: Eurostats. EUR=Euro

**Table 2: Top 10 EU tuna can suppliers in value (1000 EUR)**

	2 008	2 009	2 010	2 011	2 012
<b>Ecuador</b> (GSP) (ANDEAN)	290 130	176 339	174 039	229 248	308 581
<b>Thailand</b> (GSP) (ASEAN)	166 689	152 787	168 031	206 371	170 623
<b>Seychelles</b> (GSP) (ACP)	148 967	157 741	150 090	171 513	195 282
<b>Mauritius</b> (GSP) (ACP)	127 482	104 027	130 191	143 983	199 379
<b>Ivory Coast</b> (GSP) (ACP)	120 870	106 347	80 804	84 420	138 612
<b>Philippines</b> (GSP) (ASEAN)	127 213	118 346	94 485	82 659	97 309
<b>Ghana</b> (GSP) (ACP)	86 860	81 294	84 973	81 852	105 351
<b>Papua New Guinea</b> (GSP) (ACP)	27 672	35 242	37 353	44 556	72 022
<b>Colombia</b> (GSP) (ANDEAN)	56 740	41 172	38 139	47 079	54 367
<b>Indonesia</b> (GSP) (ASEAN)	18 335	24 399	17 617	28 434	44 491

Source: Eurostats. Note: Association of Southeast Asian Nations (ASEAN); African, Caribbean and Pacific Group of States (ACP); The Andean Community is a customs union comprising the South American countries of Bolivia, Colombia, Ecuador, and Peru (ANDEAN)



**Figure 2: average price per kg of fish imported to the EU**

## **4. Discussion**

### **4.1. Processing and Trade Patterns**

The Ghanaian tuna processing industry is mainly supplied with raw material coming from national vessels, both purse seiners and pole and line. The former provides tuna (skipjack and yellowfin tuna) for canning whilst the latter provides raw material for high value tuna cans and loins. Distant Water Fleet (DWF) (mainly from Spain and France) land in Tema from time to time but more frequently during the closing season of Fishing Aggregating Device (FAD) fishing (January and February each year) as the price is attractive due to the lack of supply from the domestic fleet. During these two months, imports of tuna from Senegal and Ivory Coast also occur. The tuna is mainly tuna from the pole and line fishery operating in the Senegalese, Mauritanian and Cape Verde waters. Those landings are used to produce high commercial value cans using the label of "line fishing tuna". FAD fishing results in large catches of small fish (1.9-3.2 kg as against the recommended minimum of 3.2 kg by ICCAT) which is a prime conservation problem in tuna fisheries, in particular, bigeye and yellowfin tuna [12] [13].

The main markets for the tuna products are firstly the EU, secondly the national market and thirdly the Ivory Coast (Fig. 1) where a substantial amount of tuna is landed every year by Ghanaian vessels for both canning and local market purposes. During the last decade, there have been a couple of bans on export of tuna products from Ghana to EU market due to non-compliance behaviour regarding ICCAT rules such as transshipment at sea and illegal fishing outside Ghana's Exclusive Economic Zone (EEZ). During these export crisis, the Ghana Tuna Association (GTA) has tasked tuna vessel companies to conform to the best practices and other regulatory instruments introduced by Government through Ministry of Fisheries and Aquaculture Development (MoFAD) to protect the industry. The non-compliance of tuna fishing regulations will have severe consequences on the Ghanaian economy in terms of reduction in foreign exchange earnings, job losses, endangering food security [14] and poverty reduction.

### **4.2. Employment and Actors in tuna Processing**

There are three major tuna commercial processors, all based in Tema: PFC, Myroc Foods Ltd, and Cosmo Seafoods Ltd. These companies buy most of the industrial tuna catch and process them into tuna flakes, tuna chunks and tuna mash which are canned and mostly exported. These three companies have all together an annual processing capacity of 120, 000 tonnes.

Overall, the employment in the tuna fish chain is about 6, 500 comprising of those in fleet, processing, upstream and downstream. Upstream employment comprised of workers dedicated to supplying both



fishing fleet and plants with all kind of inputs (goods and services). Downstream employment is linked to the people working in the products distribution, marketing, product transportation, *etc.* The annual value added generated by the tuna industry can be estimated at around EUR 100 million. The catch value is about EUR 91 million while the direct value added of the catch sector is about EUR 35 million. The processing sector, with a selling value of EUR 120 million generated a value added of EUR 44 million. More women are employed in the processing sector than men. The trickle-down economic effect on livelihood support and poverty reduction [15] to women, their families and Ghanaian economy cannot be overlooked. This supports studies [16] [17] that post-harvest activities in fisheries, mainly, in the processing and marketing sectors are crucial to the survival of women and their dependants. However, female roles in fish processing (especially in modern processing factories) are associated with job insecurity, health issues and harassment [18]. There is therefore the need for skills development and empowerment of women working in tuna processing firms in Ghana.

#### 4.3. Performance of the processing industry and competition

Over the last 5 years, the processing plants used 50%, on average, of their production capacities. In 2013, due to the export difficulties with the EU, capacity utilisation was less than 30%. In 2012, the Ivorian tuna industry went back into operation (after closure due to the political instability) and landings from EU vessels started again affected the supply of the Ghanaian plants in Tema. In that context, storage capacities are also underused.

Currently, raw material supplied by national vessels is not enough to have the plants operating at more than 60% of their maximum capacity. Canneries are therefore trying to attract DWF in order to complement national landings which induce a fierce competition with canneries located in Abidjan. Landing of national vessels in Abidjan, despite being done on a one to one authorisation accorded by the Fisheries Commission, is more and more common due to the better price that fishing companies can get in Abidjan for tuna designated for canning and for immediate consumption by locals. However, this practice turns to be detrimental to the Ghanaian tuna industry and the Ghanaian economy since it has the tendency of increasing fishing effort and illegal fishing practices, depleting tuna stocks as well as making canneries in Abidjan more competitive than canneries in Ghana.

At the other end of the chain, the major constraint that is currently affecting the Ghanaian tuna fish chain is the reduction in Europe, since 2012, in the consumption of tuna from cans. Furthermore, on the EU market, Ghanaian tuna industry faces great competition from other countries in Asia (Thailand, Philippines, Papua New Guinea, *etc.*) and South America (Ecuador, Colombia, Bolivia, *etc.*). All these

countries benefit from the generalised system of preferences<sup>1</sup> (GSP) that EU has with ASEAN, ANDEAN and ACP groups of countries. For ACP countries such as Ghana, it means an entry to the EU market without any duty fees and quantities restriction.

There has been a general decline of canned tuna supplied to the EU since 2008 (Table 1). The principal factors include; depleting stocks [19] [6], climate change [20] [21], high incidence of by-catch species, as well as enforcement of fisheries management measures, namely, size and catch limits, fishing effort restrains, seasonal and geographical closures and restrictions on the use of FADs by the various regional fisheries bodies (that is, The International Commission for the Conservation of Atlantic Tunas, The Indian Ocean Tuna Commission, Inter-American Tropical Tuna Commission, among others) [12].

Fish price information is an important variable in determining fishing behaviour and for sustainable management of valuable natural resources like fisheries [22] [23]. From 2008 to 2011, the price per kg of fish imported in the EU remained more or less the same (all types of products together). In 2012, due to the constriction of the supply, it went up from EUR 3/kg to EUR 4/kg. Within that period, Ghana has remained in the same position comparatively to other countries: at the middle of the rank.

Indian Ocean and Latin American countries gain a better average price per kg than Ghana does, while on the contrary, Asian countries get a smaller price. There is therefore some margin of progress here to make in order to reach the Seychelles and Colombia prices. Better quality products and products differentiation are the options currently developed by the two exporting companies (PFC and Myroc).

A more radical option, also taken by these tuna processing companies is to develop other types of products such as loins and sashimi quality products knowing that average export price for the different categories of products are:

- frozen = 700 EUR / t;
- loins = 2980 EUR / t ;
- canned = 2760 EUR / t
- frozen grade A sashimi quality 9000 EUR / t

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<sup>1</sup> The Generalised System of Preferences, or GSP, is a preferential tariff system which provides for a formal system of exemption from the more general rules of the World Trade Organization (WTO). Specifically, it is a system of exemption from the most favoured nation principle (MFN) that obliges WTO member countries to treat the imports of all other WTO member countries no worse than they treat the imports of their "most favoured" trading partner. In essence, MFN requires WTO member countries to treat imports coming from all other WTO member countries equally, that is, by imposing equal tariffs on them, *etc.*

Ghana at the moment exports to the EU market about 3, 000 tonnes of loins which is about 3 % of the total imports (led by Ecuador with 35 % of the market share). The competition is fierce with South American, Asian and Indian Ocean countries. Thus, alternatives have to be found. Prospects for frozen sashimi products seem to be more open. Despite the fact that annual consumption of sashimi in Japan is declining, the sashimi tuna market is becoming increasingly globalised, with markets expanding outside of Japan as consumers seek out healthy eating options and become more adventurous in eating international foods. An estimated 60,000-100,000 tonnes is currently supplied to other non-Japanese sashimi markets. The first sashimi markets to develop outside of Japan in the 1990s were the US and Europe (particularly, the UK). Sizeable markets have since developed elsewhere in Asia, with consumption in Korea, China and Taiwan already exceeding that of the European Union. The growing popularity of Japanese food is also evident in Australia and New Zealand, with a huge boom in the past several years of fast-food retail sushi outlets. Markets are also emerging in Eastern Europe (i.e. Russia) and South America (i.e. Ecuador).

The other possibility of improving the performance of the tuna industry in Ghana is the development of by-products such as fish oil and fish meal using the raw material waste (tuna heads, bones, *etc*). PFC is already running such a small-scale project and aim to make it at industrial-scale. This will significantly help the reduction of waste and at the same time improve the benefits per kg of tuna processed. Overall, remaining competitive requires innovation projects for economic maximisation of the raw materials. Maintaining sustainable fishing is also crucial, however, Ghana's tuna resources is mostly taken by Japan and Korea vessels with China and Spain responsible for most illegal catches by pair trawling [24]. This calls for effective monitoring, surveillance and sanctions [25] in order to protect the tuna fishery resources of Ghana for sustainable utilisation.

## **5. Conclusion**

Ghana has huge potential to increase tuna fish export to the international markets. The current data and statistics convey that tuna processing sector provides economic benefits to the Ghanaian economy (employment, foreign exchange, food). However, there is the need to strengthen the knowledge base in tuna fishing, with particular emphasis on the sustainable management of the resources, and to find ways of reducing by-catch species, unwanted or incidental catches, in any tuna fishing activity. The need for reinforcement of actions against Illegal Unregulated and Unreported (IUU) fishing as well adherence to ICCAT regulations and best fishing practices are vital for the tuna fish chain. Ghana has now intensified its Observer Programmes On-board Vessel, re-established the Vessel Monitoring System (VMS) and strengthened the Surveillance by the acquisition of more patrol boats, which will occasionally provide

joint naval and fisheries patrols to further curb the mismanagement of the resources. The tuna processing sector is a major backbone of the Ghanaian economy and must be managed efficiently for the current and future generations.

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