Institutional challenges and constraints for Ghana in exporting fishery products to the European Union

Yolaine Beyens, Pierre Failler and Berchie Asiedu

Abstract

The objective of this article is to provide an analysis of the key institutional challenges and constraints that Ghana faces relative to food safety when exporting fishery products to European countries. Particular attention is given to the way Ghana conforms to European Union (EU) import requirements and complies with specific food safety measures, including traceability constraints. The major findings of the analysis are, firstly, the growing difficulty for institutions to adapt to more and more stringent EU regulations and to develop new sets of domestic rules; and, secondly, the lack of collaboration between key institutions does not allow the establishment of an efficient food safety system. These findings are important not only for Ghana, but also for other countries that are currently exporting fish to Europe or that wish to do so.

Keywords: food safety, EU import procedures, requirements, developing countries, illegal fishing

1. Introduction

In 2014, 12 million tonnes (t) of seafood products were consumed in the 28 member states of the European Union (EU), of which more than five million tonnes originated from almost one hundred overseas countries.(1) Importation of quality fishery products has been an EU concern since the early 1990s.(2) To protect consumers' health, the EU has put in place food safety rules with standards that exporting countries have to comply with before fish consignments can be shipped to the EU. For the 25 African countries that are authorized(3) to export fish and fishery products to the EU, compliance with more and more complex and stringent standards becomes a challenge for the government and the private sector. Furthermore, since 2010, importing countries have had to comply with another set of EU regulations to prevent, deter and eliminate Illegal, Unreported and Unregulated fishing (IUU),(4,5) comprising another hindrance to export. However, as fish legality in the EU context is a full subject and already addressed both from a broad perspective(6,7,8,9) and in the more geographically focused setting of West Africa and Ghana,(10,11,12,13,14,15) this paper will

concentrate on food safety in fisheries with regard to institutional challenges in Africa, which is an issue left behind in terms of research coverage.[16,17,18]

As an EU partner, along with other agricultural export products also submitted to EU requirements, Ghana derives the maximum benefits from its fish and fishery export products. In particular, Ghana, one of the major tuna exporters to the EU, faces institutional constraints in meeting EU requirements.[19,20,21,22,23,24,25,26] According to the Ghanaian Fisheries Commission, the country exported about 57,000 t of fishery products in 2014, mainly comprised of tuna (80 per cent) and demersal fish and cephalopods (20 per cent). A share of the tuna landed is, by law, sold in Ghana as a domestic product. More than 70 per cent of the tuna went to the EU, with Eurostat data for that year recording 21,500 t of cans, 3,000 of frozen tuna, 1,500 of loins and 3,500 of cephalopods and demersal fishes.[27] The remaining 30 per cent went to China and Japan, as well as neighboring countries such as Cote d'Ivoire, Liberia and Togo.[28]

Ghana has long developed a policy of exporting high value products (USD 300 million in 2015[6,29,30,31]) for the development of the industrial fishing sector and tax collection, while importing low commercial value species, such as small pelagic species (USD 140 millions for 200,000 t in 2015), in order to sustain the high consumption (28 kg/capita/year). For the foreseeable future, concerning the food security issue, Ghana will continue to import fish such as sardinella and mackerel to supplement the domestic supply, as the marine (300,000 t), inland (90,000 t) and aquaculture (45,000 t) production altogether satisfy about 70 per cent of domestic needs in recent years.[28,32,33] The growth in aquaculture will progressively counterbalance the decrease in marine catches (less 100,000 t over the last ten years[28]). However, it is highly improbable that aquaculture products (mostly tilapia) will be exported to the EU, as their sector is not competitive.[28,34] Imports of tilapia in Europe mainly come from South America and China, and are sold at a low price.[34] For the majority of the 26 million Ghanaians, fish is the most important source of protein (60 per cent of protein requirements), as well as an important source of revenue, as more than 2.5 million people, including those who rely on them, are involved along the fish chain[28] (around 6,500 people directly in the tuna processing industry[33]).

The country has indeed addressed both food safety and illegal, unreported and unregulated fishing concerns. The latter has taken almost two years of efforts, from November 2013 to October 2015, to address

and to enable the country to fulfil its obligations.[26,35,36] Not only was the yellow card lifted, but Ghana was able to show a compelling commitment from the government, demonstrating to other countries that a change in ocean governance is possible.[36] This situation is shared by other African fishing nations authorized to export to the EU.

This paper examines the institutional framework that Ghana is implementing to comply with food safety EU rules for fishery products. It also analyzes the major constraints the government and private enterprises are facing in putting in place such a framework. Ghana is considered to have a broadly satisfactory record of compliance with EU food safety requirements, except Rapid Alerts (non-compliances that could lead to unsafe products), reported by the EU border post fish inspectors as serious infringements, as detailed later. These findings are likely to help other African countries to better design their food safety system and implement EU regulations. Furthermore, some of these conclusions can be applied to the current context of other developing countries, particularly in Africa.

After reviewing the EU general import rules on sanitary and illegal, unreported and unregulated fishing issues in the first section, the paper will draw attention, in the second section, to the institutions involved in the fish trade in Ghana. Then, in a third section, the institutional sanitary challenges to exporting to Europe will be reviewed.[37] Difficulties encountered by developing countries will be detailed in a fourth section, based on the Ghanaian case study, while, in a fifth section, a discussion will be opened to further aspects that could ease the fish trade to Europe. Finally, a conclusion recalls the major points outlined in the paper.

2. EU IMPORT CONDITIONS FOR SEAFOOD AND FISHERY PRODUCTS

The EU import requirements for seafood and fishery products are based on both food safety (safe for the consumer) together with seafood traceability and legality of the catches (proving the fish is not issuing from illegal, unreported and unregulated fishing). The food safety aspect is under the control of the EU Directorate DG Health and Food Safety (DG Santé, ex-DG Sanco) whereas the EU-Directorate DG Mare has the command over the illegal fishing issue.

2.1. Food safety of fish and fishery products

Under European Food Law, the Directorate-General for Health and Food Safety (DG Santé) has set up harmonized import regulations to govern the import into European countries of seafood and fishery products from developing countries. These rules are considered equivalent to those laid down in Council Directive N°91/493/EEC on health conditions for the production and the placing in the market of fishery products of EU members states.[38] Such a legislative package ensures the EU consumer that quality and food safety management, including inspections of the products and procedures, are carried out from the producer (fishing vessel or aquaculture farm) to the consumer's fork. The EU Food and Veterinary Office is due to inspect, from a food safety perceptive, the eligible countries. Such countries must possess an authorised Competent Authority (CA) in charge of official controls over the production chain and provide a reliable health certificate to the products. Official controls must underlie applicable hygiene and public health requirements, including the required analysis, equivalent to EU food safety regulations, must be undertaken with regard to all approved vessels and establishments (processing plants, freezer and factory vessels, cold stores). Approved establishments must be found to meet the food safety rules, through corrective actions, if necessary. A list of all approved establishments is then published on the EU website. Live fish, their eggs, and gametes intended for breeding must also be in line with relevant animal health standards, and veterinary services must be sure of their implementation and monitoring. The CA must guarantee that fish, bivalve molluscs, echinoderms or marine gastropods come from approved and listed production areas, free from contamination.[39] A yearly control plan on heavy metals, contaminants, residues of pesticides and veterinary drugs, fitting with the EU regulations, must be submitted for aquaculture products. Border inspection posts, located in the EU approved ports, have to carry out regular inspections in a procedural way.[37]

However, only fish and fishery products originating from wild capture will be treated in this way, since aquaculture products are not yet exported to the EU by Ghana.[34] Besides, such exportation to the EU constitutes a subject of its own: it must, among other differences, be in line with aquaculture EU regulations, further analysis (e.g., residues of veterinary drugs, norovirus, etc.) be undertaken, and additional requirements and procedures be verified for the private sector.

2.2. Rules of origin and fish legality

Concerning seafood traceability and fish legality, the EU Commission DG Mare wants to prevent illegal fish entry into the EU market.[37] According to the FAO SOFIA (2016) report,[41] "Illicit fishing may account for up to 26 million t of fish a year, or more than 15 per cent of the world's total annual capture fisheries output", meaning that those fish issuing from unsustainable practices generate economic losses (around USD 23 billion[42] in 2014) and social disturbances. Hence, in 2008, the EU launched Regulation (EC) N°1005/2008 to establish a community system to prevent, deter and eliminate illegal, unreported and unregulated fishing[4] and, in 2009, Regulation (EC) N°1010/2009 to implement N°1005/2008 to combat such illegal fishing.[5] Both coming into force in 2010, all exporting countries have to comply with them to export to the EU. These regulations concern all fish landings and fish transhipments to EU and third-country vessels. One of the principal outputs of Regulation N°1005/2008 resides in the Catch Certificate[4] (Article 31), delivered to every fish consignment exported to the EU. It proves the fishery products are not coming from illegal, unreported and unregulated fishing, guaranteeing the seafood traceability by the flag state through the fish production chain. It applies to all fish landings and fish transhipments in an EU and non-EU port. A Catch Certificate must be signed by the fishing master of the vessel and endorsed by the fisheries authority. The other targets of Regulation N°1005/2008 are to abide by international conservation and management regulations and practices, and to encourage cooperation between the flag states.

In case the EU Commission notices such illegal fishing operations are reported from the vessels of the flag state, the Commission duly informs the country by a yellow card (or warning). Then, the Commission starts a process of cooperation and formal assistance to help the country strengthen its legal framework and practices, and monitors the progress regularly. The outcome is either a green card (or a de-listing) presented to the country when it is found to have resolved all issues reproached, or a red card if the flag state has not straightened out the problems within a specific time frame. In the latter case, a trade ban on exporting to the EU is issued until the country has implemented the appropriate actions, although trade is still possible in other markets.[10]

3. INSTITUTIONAL DIMENSION OF FISH TRADE IN GHANA

From an institutional perspective, the key players in the fish trade in Ghana cover different aspects of the national, regional and international trade. Aside from the regional export capacity with the neighboring countries, a total of 54 approved Ghanaian establishments are authorized to export fishery products to the EU: 38 freezer vessels, 15 processing plants and one cold freezer,[43] supplied mostly by the industrial fishing fleet but also by the approved small-scale sector. According to information provided by Eurostat,[27] (Table 1) fishery products exported to the EU amounted to over 30,000 t in 2014, mainly composed of canned tuna (80 per cent).[24,28]

Table 1. Ghana fishery products exports to the European Union

	2010	**2011**	**2012**	**2013**	**2014**
Volume (t)					
Tuna loins	2700	2838	3226	2235	1548
Tuna preserved	24629	24139	25330	21305	21498
Tuna frozen	4691	1817	1750	1524	3041
Cephalopods	3070	3100	2709	1727	3057
Fishes	397	500	353	246	196
Others	86	99	61	33	239
Total	35573	32494	33429	27068	29578
Value (Million USD)					
Tuna loins	8.8	8.8	12.4	9.7	7.3
Tuna cans	70.9	70.3	93.1	88.7	94.0
Tuna frozen	43.2	28.9	33.4	61.4	73.2
Cephalopods	11.9	11.7	4.9	10.4	8.0
Fishes	1.3	1.0	0.8	0.7	0.3
Others	0.5	0.3	0.1	0.6	0.5
Total	136.6	120.9	144.8	171.6	183.3

Source: Eurostat

The record of the major institutions involved in fish trade and their respective roles was developed through meetings with authority representatives involved and field visits[44]. Also, reports from DG Santé and the Food and Veterinary Office [45,46,47,48], various articles and reports, together with a website review of European regulations, were thoroughly analyzed.

Table 2 gives an overview of the responsibilities of key institutions and their links to trade and the quality of fish products. Their mandate and accomplishments regarding fish product control, certification and trade procedures are presented in subsequent sections.

Table 2: Key institutions related to trade, export and quality of fishery products in Ghana

Public Institution	Responsibility	Link with Trade and Quality
Ministry of Trade and Industry	• Trade and industry policies developing, monitoring and assessment • Advice to the Government on these issues as well as to the private sector • Coordination, monitoring the implementation of programmes for private sector • Advocacy within Government for the Private Sector	• Trade strengthening • Market and product diversification for export (regional and international) • Making sure that domestic trade is conducted in a smooth and organised manner
Ghana Standards Authority	• Reference institution when quality, health and safety of a product is concerned • Formulation of Standards • Inspections for agricultural and non-agricultural products • Accredited laboratory testing • Certification of products and quality management systems (Sept. 2014)	• Supporting domestic, regional and international trade • Competent Authority (CA) for Fish Control when fishery products are to be exported to Europe • Health Certificate (EU)
Food and Drugs Authority	• Regulation of the food, drugs, food supplements, veterinary medicines etc. • Conduct inspections in domestic manufacturing industries	• Is currently interested mainly in quality of the imported products and in products manufactured locally • Is concerned by quality of the domestic, imported and exported products (regional

		and international markets)
Fisheries Commission	• Providing fishing licence. • Approving the Catch Certificate • Enforcing MCS plan (traceability) • Institution taking in charge aquaculture and fish safety (disease)	• Providing fishing licence. • Catch Certificate (EU) • IUU Traceability
Excise and Preventive Services (CEPS)	• Verifying documents and goods quantity at export and import at the main border points	• Entering export and import figures on GC-Net

Source: Compilation by the author**s**

3.1. Ministry of Trade and Industry (MoTI)

The Ministry of Trade and Industry[49] establishes policies so that trade and industry grow competitively within domestic, regional and international markets, including economic growth and employment creation for vulnerable groups. The Ministry of Trade and Industry wishes to promote Ghana as a major manufacturing, value-added, financial and commercial center in West Africa.

The Ministry of Trade and Industry has, in particular, recently developed a logistics and value chain division. This division is interested in all activities that can bring value and competitiveness to the country. More specifically, the division, which is turned towards exports, concentrates on key areas, including the fish trade.

3.2. Ghana Standards Authority (GSA)

The Ghana Standards Authority (GSA)[50] belongs to MoTI and employs around 3,500 people at its central and decentralized sites. The GSA was established by the Standards Authority Act in 1973.[51] Structured into different divisions, the GSA has evolved into the public institution of reference for Ghana where food quality and safety are concerned (agricultural products, especially fishery products).

The GSA is a large statutory body in charge of the national quality infrastructure embracing metrology, standards and conformity assessment (certification, inspections and testing). The GSA is expected to become a model of excellence in standardization in Africa. Its mission is to promote standardization to upgrade the quality of goods, services and rigorous management practices in both the public and private sectors in Ghana. The Certification Division and the Inspectorate Division are in the process of undergoing conformity assessments in their respective domains. The Testing Division has been accredited, since 2008, for various types of analysis. Most testing can now be done locally, in accredited laboratories or through proficiency testing.

The GSA has been designated, by joint agreement between the Ministry of Commerce and Ministry of Agriculture of the Government of Ghana, to host the Fish Inspection Unit in charge of the control of the fish exports to EU. Since 1998, the GSA has been endorsed by a team of European inspectors to take in the CA, the body dealing with fish and fishery product exports to the EU.[52] The CA—currently the Fish Control and Export Project Department—depends on the Fish Inspection Department. This system is also regularly monitored and assessed by the Food Veterinary Office. The latter carries out missions to evaluate if the official controls put in place by the CA are in line with the requirements of the EU.

While for exported products, and especially tuna, standards are well enforced, there are still some improvements to be accomplished for national standards. In respect of regional trade, Ghana participates in establishing the Harmonisation of food safety measures—particularly Sanitary and Phytosanitary (SPS) measures for fishery products—launched by the East African community for all Africa. Work is also ongoing to establish an African Union Food Safety Authority, incorporating a Rapid Alert System for Food and Feed (RASFF).[53,54] Currently, the GSA receives strong support from the Trade Capacity Building program of the United Nations for Industrial Development Organization (UNIDO), the EU Trade Related and Quality Enabling Programme (TRAQUE), the Better Training for Safer Food Programme (EU-BTSF) and the INS ISO Programme. These programs cover technical assistance, including delivering or funding training workshops. Furthermore, the GSA has been recognised as the CA for imported products (in Ghana), including frozen fish.

3.3. Food and Drugs Authority (FDA)

The Food and Drugs Authority was established in August 1997.[55] It is another national regulatory authority charged with the regulation of food and drugs, but also food supplements, herbal and homeopathic medicines, veterinary medicines, cosmetics, medical devices, household chemical substances and tobacco. The Food and Drugs Authority legal mandate is found in part 6 (tobacco control measures), part 7 (food and drugs), and part 8 (clinical trials) of the Public Health Act, Act 851 of 2012.

The Food and Drugs Authority is recognized for its role in the domestic and regional market as well as in relation to goods imported to Ghana. The activities of the Food and Drugs Authority are carried out at the various entry and exit points of the country, such as Tema port, Takoradi port and Kotoka international airport. The primary concern for the Food and Drugs Authority is that imported food and drug products that reach the consuming public are safe, of high quality and efficacious (in the case of drugs). The agency seeks to achieve the above through authenticity checks on registered imported goods, identifying unregistered goods and enlarging the scope of regulation at the ports of entry so that all products fall under the Food and Drugs Authority's act.

From field visit and discussion with authorities, it appears that Food and Drugs Authority approval is compulsory to achieve regional export, but to carry out export to Europe, accompanying documents must enclose also the GSA Health Certificate[48,52].

3.4. Fisheries Commission

The Fisheries Commission has been established by the Ministry of Fisheries and Aquaculture Development (MOFAD) as a technical agency.[56] The Fisheries Commission employs approximately 380 people, both in centralized and decentralized bodies at coastal and inland landing sites. The Fisheries Commission is authorized by the Fisheries Law Act 625[57,58], to regulate and manage the use of fishing resources in Ghana and to coordinate the Ghana Fishery and Aquaculture Policy (2008). The Fisheries Commission has also launched the Ghana Aquaculture Regulations (2010) in the Ghana Fisheries Regulations LI 1968 (2010)[57,59,60]. Ghana has also developed a Ministerial Directive for Minimum Sanitary Requirements for Vessels Operators (2016)[61] as well as the Republic of Ghana Fisheries and Aquaculture

Sector Development Plan (2011–2016)[62] and the Fisheries Management Plan of Ghana (2015-2019)[57,63], between others.

In respect of seafood and fishery products traded to the EU, the role of the Fisheries Commission to possess in its legislative framework a system competent to fight against the illegal, unreported and unregulated fishing and implement adequate measures and activities, particularly in the application of EU Regulation N°1005/2008. One of the primary results is to provide a reliable Catch Certificate for every fish consignment exported to the EU. Resolving the illegal, unreported and unregulated fishing issue is highly important, but it is first of all a question that requires political will.

Over the last decades, some weaknesses in Ghana's marine fisheries—poor governance, excessive fishing pressure and overcapacity, usage of illegal gears and weak conformity with the controls[56,57]—have explained the decline in production and the growing importance of overexploited stocks.[64] As a consequence of several offenses of Ghanaian vessels against Regulation N°1005/2008, reported by member states to the Commission, a yellow card was issued by the EU in November 2013.[25,26] Therefore, thanks to formal EU assistance, authorities started to solve the problems related to illegal, unreported and unregulated fishing. The work lasted for almost two years before the yellow card was lifted and the country cleared[35,36,65] in October 2015.

3.4.1. Yellow card status versus EU trade

Under the yellow card regime, no proper trade ban from the EU affects fishing vessels having a trustworthy Catch Certificate, but certain reluctance from EU clients or lower deals could be encountered. However, some EU countries can decide not to trade with any vessels bearing a flag affected by the yellow card.[10] Other markets than the EU had thus to be found for many establishments, risking being less rewarding. As for the loss incurred during this period, it has not been studied precisely.

3.4.2. Recent achievements complying with EU Regulation N°1005/2008

Through discussions and technical assistance from the EU and other partners, the Fisheries Commission now has a complete arsenal of measures to combat illegal, unreported and unregulated fishing; its capacity has been improved by means of better legislation, an operational Monitoring, Control and

Surveillance (MCS) system, enhanced fisheries management rules to follow, as well as settled regional and international agreements.

In 2014, in accordance with the International Plan of Action to Combat Illegal, Unreported and Unregulated Fishing, which was "required to be implemented at national and regional levels", the National Plan of Action to prevent, deter and eliminate illegal, unreported and unregulated fishing was endorsed.[66] Ghana complemented the Fisheries Act 625 (2002) with the Fisheries (amendment) Act 880 (2014)[67] and the Fisheries (amendment) Regulations 2217 (2015).[68] The monitoring, control and surveillance system is strengthened by additional tools falling into the licensing and authorization, registry of vessels, vessel monitoring systems and observing program categories. Thus, Ghana can track vessels at all times at the monitoring, control and surveillance enforcement unit centre by installing a vessel monitoring system and an automatic identification system on industrial vessels (tuna trawlers). Sea patrols, observers on vessels, land and beach patrols, port inspection, vessel registry, catch declaration, catch certification, entry and exit declarations by foreign vessels, designated ports and aerial surveillance are other tools of the monitoring, control and surveillance system put in place. Ghana has established penalties to deter illegal fishing ranging from USD 1 to 4 million.[13,14]

Moreover, current depleting of Ghana's marine fisheries (loss of 100 mt over the ten last years) is to be halted and reversed by means of a long-lasting management system for fish exploitation in a steady environment, the five-year Fisheries Management Plan.[57,63] Consequently, the plan has among its objectives, to reduce pressure on fish stocks and guarantee their exploitation to a level biologically acceptable; to protect marine habitats and biodiversity; and to strengthen participative co-management. One of its principal strategies is the closed fishing season that forbids vessels from exploitation, reducing pressure on the resource and allowing fish to spawn and thus enhancing recruitment. In 2016, a stock assessment by a research vessel is foreseen to determine closed fishing areas.[65] The Fisheries Commission collaborates with several agencies—among them the Ghana Navy, Ghana Police and Ghana Air Force—to track vessels.

The National Plan of Action against illegal, unreported and unregulated fishing also involves the obligation to sign and ratify with Regional Fisheries Management Organizations and abide by international agreements as a way of strengthening the monitoring, control and surveillance system. There is inter-agency collaboration in the area of monitoring, control and surveillance activities—the Fishery Committee for

Western Central Atlantic (Benin, Ghana, Ivory Coast, Liberia, Nigeria and Togo)—for harmonizing national illegal, unreported and unregulated fishing policies.

The Fisheries Commission is assisted by several major projects interacting on some topics: the West Africa Regional Fisheries Programme (WARFP), financed by the World Bank, provides substantial support for the Fisheries Commission,[69,70] covering, among others, illegal fisheries and value chain addition issues. Other important programs include the International Commission for the Conservation of Atlantic Tunas (ICCAT),[70,71,72] the Ghana Sustainable Fisheries Management Project (USAID)[73] and the Ghana National Aquaculture Development Programme (GNADP).[74,75]

3.5. Customs excise and prevention service

The Customs Division (or Excise Prevention Service) belongs to the Ghana Revenue Authority.[76] It is responsible for the collection of various taxes, particularly import duty, import VAT, export duty, import excise and other taxes. In turn, the taxes are used to finance the country's budget and development projects in health, education, housing and transport sectors. This collection is achieved by physically patrolling the borders (Tema Port, Takoradi port and Kotoka international airport) and other strategic points, examining goods and collecting documents relating to the goods.

As part of the process in trading fishery products, there is a trend that exporters and importers have to declare different details, including quantity, fish species and the vessel products are loaded to or unloaded from, on the single electronic online network GC-Net declaration of the Ghana Trade Net. As a result, users can track their consignment at any time. This declaration is taking on more and more importance, but has not yet reached its total capacity.

To close this presentation section, it emerges that the most important Ghanaian institutions involved in the fish trade from a food safety point of view are, firstly, the Ghana Standards Authority for fish trade with the EU, in charge of issuing the mandatory EU health certificate. The Food and Drugs Authority is, from the same food safety perspective, mainly accountable for the national and regional fish trade. The Fisheries Commission is responsible for issuing both fishing licenses and Catch Certificates (also mandatory

in the EU) for fishing vessels. The Customs Excise Prevention Service is the institution tasked with collecting taxes for all fish trade issues.

4. INSTITUTIONAL PRINCIPAL SANITARY CHALLENGES TO EXPORT TO EUROPE

Developing countries willing to export fish and fishery products to the EU are confronted with significant institutional challenges. Starting with a review of them, issues are developed further in the following section. These issues, mandatory to be on the eligible list of countries, are intended to protect the consumers in terms of food safety.

4.1. Current food safety problems

In general, among developing countries and in Africa in particular, there is to a greater or lesser extent, a certain consistency in the type of food safety problems experienced by institutions, including (but not limited to):[54,77]

- Spotted food safety legislation in several institutions, resulting in incomplete coverage; some legislation not always based on risk assessment; legislation not in line with market standards.
- Insufficient food inspectors, often suffering from inadequate training and logistical support, and lack of clear inspection procedures; only a few countries have food inspection and certification at their borders; limited utilisation of the Rapid Alert System for Food and Feed network.
- Testing laboratories not always accredited ISO 17025 for specific tests: inadequate facilities, poorly trained staff and lack of financial capacity funded by government and private sector; no regional reference laboratory.
- Similar enforcement procedures used for the Food Safety Department and the testing laboratory department; conflict of interest.

- Focus of controls on export rather than on enlarging other small and medium enterprises feeding the country, resulting in food safety and hygiene lack of knowledge and financial assistance; this would make it difficult to improve exports as well as to put in place free movement of goods across Africa.

4.2. The choice of Competent Authority (CA) location

The country must primarily provide the Food and Veterinary Office with a copy of the comprehensive dossier composed of descriptions of an enforced fish control unit, or Competent Authority, able to perform inspection duties, and to install and enforce national food safety legislation in the country along with standard operating procedures[38]. The setting-up of an environmental monitoring plan and access to accredited food safety laboratories are also compulsory. Furthermore, explanations[37,78] have to include the willingness of the fishery industry-or food business operators - to export and fulfil EU requirements.

The actual choice of the CA site will be approved by an Food and Veterinary Office inspector team through a dossier analysis and, if necessary, a field mission on the spot will be undertaken. Besides the questions raised by the dossier, additional factors will help the inspectors in assessing several factors, including the infrastructure attributed to the fish control unit and eventually that of the testing unit, fishery establishment field visits and the possibility of future development (staff evolution, training options, allocated budget and infrastructure space). In Ghana, European inspectors confirmed the GSA (formerly the Ghana Standards Board) as host of the CA[52] and in charge of overseeing fish exports to the EU. Several countries eligible for to export fish products to the EU, rather than establishing their CA under a Ministry, have chosen the option of setting it in an independent structure, like the European Food Safety Authority (EFSA).[77]

4.3. A gazetted food safety legislation equivalent to the EU Food Law

Food safety legislation must "at least be equivalent to the EU food safety law regulations and decisions" as laid down in Regulation EC N°178/2002,[79] establishing the European Food Safety Authority.[80] The regulation gives instruction on procedures in matters of food safety, including product traceability, covering the whole process from production to distribution. The legislation has to be gazetted

and signed by the government to be enforced. Provisions are contained in Regulation EC N°882/2004 to install the CA and thoroughly explain its duties.[81]

Food safety legislation must comprise subjects that apply to the fishery industry and have to be controlled by the CA, providing guarantees at an internal level as well. Under Regulation EC N°852/2004, requirements for best hygiene practices are laid down, including hygiene on board fishing vessels, in processing establishments, during packaging and storage[82]. Furthermore, the regulation implies the need for compliance with a system of Hazard Analysis and Critical Control Points (HACCP) and the development of national good practice guides.[83] Both the CA and food business operators will also find in Regulation EC N°853/2004 specific requirements on hygiene rules for food of animal origin, with a particular interest in avoiding any contamination of the product.[84] Rules of establishment registration and approval, together with those related to product imports and identification, are also included. Furthermore, to approve the establishments, the rules to organize official controls, including audits for the CA, are consigned in Regulation EC N°854/2004.[85] Sampling methods and standards for microbiology and histamine are described under Regulation EC N°2073/2005.[86.87] Analysis methods are moreover presented to the CA and food business operators in Regulation EC N°2074/2005, among which are parasite and biotoxin detection, and total volatile basic nitrogen to detect freshness.[88] Regulation EC N°1881/2006 and amendments [89,90,91] sets out maximum limits for other contaminants. The concerns of Council Directive N°98/83/EC[92] are drinking water quality and standards for human consumption, including the water used by the food business operators for food processing and the landing sites of fishery products.

At the time of the study, the Ghanaian food safety legislation, reviewed and accepted by the Food and Veterinary Office inspectors in 2013, is based on the Fishery Products Regulations 2007 (FPR).[93] The FPR was completed by Amendment 1 on the maximum residue level of cadmium and lead and Amendment 2 on the fish species families subjected to histamine as Regulation (EC) N°2073/2005 states (bill in 2014).[94]

4.4. Regular official controls of the Competent Authority

The final objective of the CA is to sign health certificates for fish consignments issued from approved establishments, enabling products to be exported to European countries. To this end, the CA has to

undertake official inspections of these establishments (fishery vessels, processing establishments, ice factories, cold stores, etc.) as well as of products coming from them and at the export desk to make sure that the concerned establishment applies best practices and has food safety control at every point of the production chain. When drawing out an official sample, before export, the CA has to convey it to an accredited laboratory. Should imported products be supplied to fishery processing establishments, these are also verified by the CA inspectors in accordance with the food safety legislation.[95] An environmental monitoring plan for natural water bodies must be produced at regular intervals to check fishing area quality. The legislation also gives the CA the capacity to pronounce sanctions and penalties if, for instance, an approved establishment does not comply with the food safety regulations within a limited time frame. In that case, the CA has to show powers to withdraw approval from exporting to the EU. The process may involve officially agreeing with some other institutions (i.e. accredited laboratory, approved independent transport) and the public sector of other competencies (i.e. fisheries authorities) to cover the whole process. The CA must ensure that staff performing official controls obtains competencies and training in the area of their assignments, enabling them to undertake official duties and carry out official controls in a consistent manner. Additionally, any documents of inspection, procedures of establishments and certifications of products must be updated and kept for Food Veterinary Office inspection.

In Ghana, a system of official inspection and approval of establishments and vessels has been established by the CA and, as part of the scheme, standard operating procedures and checklist forms have also been developed. Moreover, the CA has put in place controls on imported products supplied to approved establishments. Apart from inspection reports always being documented in the CA office, these reports should be sent to approved establishments, and eventual follow-up organized should there be any non-conformities.

4.5. Access to accredited laboratories

The next important point is for the CA to have access to analysis services to test samples against various contaminant standards coming from both fishery establishments and products for export.[96] According to EU food regulations, such tests have to be done by official International Organization for

Standardization (ISO) accredited laboratories using EU methods. The tests performed on fishery products and water and/or ice include microbiological tests, as well as tests for histamine, heavy metals, polychlorinated biphenyl, dioxins and polycyclic aromatic hydrocarbons. Furthermore, to check the safety of the fishing areas following the environmental monitoring program, the laboratory might have to expand to test for other potential contaminants. The CA and the testing sections are located in different divisions of the GSA, CA fish inspectors having officially agreed, on enrolment, to keep away from any conflict of interests.

Moreover, thanks to international assistance (including UNIDO and EU) and Ghanaian government budget support, the various laboratories are accredited or under proficiency testing, so most analyses can be currently done on site. Except for organoleptic checks of the fishery products for freshness performed by the CA staff for official controls, the CA depends on either GSA accredited laboratories using an EU reference method, laboratories under successful proficiency testing (e.g., FAPAS®), or an EU reference laboratory located in Europe. Samples are regularly collected by laboratory staff (official checks). Establishments also undertake analyses (own checks) on a recurring basis through their own internal or external laboratories.[44,46]

In conclusion, the main institutional challenges to the country's export of fishery products to the EU described in this paper, from the sanitary perspective, are the five stepping stones depicted earlier. The country has to be approved by the European Union to export fishery products inside its borders and has to be endowed with a CA settled in an appropriate institution. The key point is the equivalency of requirements of national food safety legislation with EU food law. The CA has to organize its activities so as to be compliant with the national law and enforce it following standard operating procedures. The next challenge relates to regular access to the accredited laboratories for both the CA and the food industry. Some of these challenges are not easy to meet, and the institutional constraints on the export of fishery products to the European Union will be analyzed in the next section.

5. INSTITUTIONAL SANITARY CONSTRAINTS TO EXPORT TO EUROPEAN UNION

Several limitations to the export of fishery products to the EU are slowing down the sector. A country willing to ship to Europe has to be mindful of the following institutional constraints.

5.1. Human resources

Understaffing of the CA may affect the organization in terms of its inspection and administration duties. Furthermore, insufficient logistical equipment—such as transport and inspection kits—will undoubtedly affect the inspections and their efficiency. Not only do staff have to be recruited, but they must also be trained continuously according to the work to be done, and the proper logistical equipment provided to them. The national budget allocated to the CA has to be calculated according to the size and qualifications required of the industry. No section should be left out. All CA inspectors have to work with the highest transparency and confidentiality. The CA staff must agree to avoid any conflict of interests and corrupt practices. Official inspections of an establishment are performed by a two inspector team, randomly chosen. No inspector is affiliated with an establishment. They have to document their inspections, keep a copy of the key documents of the approved establishments, and communicate with their hierarchy.

In Ghana, the CA officers are all be able to deal with a wide range of fishing companies: the EU export approved fishing industry comprises purse-seiners and pole-and-line tuna vessels, freezer vessels, processing plants (including tuna canneries) and small-scale authorized fishing canoes, as well as cold stores. However, there is a trend to concentrate on the more demanding and complex industrial sector and to neglect, to an extent, the small-scale sector, representing vessels supplying approved small and medium enterprises. An adequate number of CA inspectors, with the logistical means to cover the size of the fishing industry, properly trained and administered, is the first constraint.

5.2. Official agreements

Lack of (or weak) formal agreement between various authorities involved across the fish chain could create traceability problems and thus be a hindrance to efficient trade. This happens when mandates of concerned institutions overlap and hence interfere with the responsibilities of a specific section of the production chain, as is the case in Ghana. The outcome is incorrectly tracked raw material coming from the small-scale fishing sector (primary production) supplied to approved establishments, creating confusion later in the chain. Besides, weak monitoring of improved landing sites could result in fish contamination or cross-contamination. Cross-contamination is an indirect contamination of fish caused by contact with contaminated

raw material or other source (e.g., improperly cleaned contact surface and utensils, clothes, animals, money). Furthermore, a poor agreement between the CA and accredited laboratories could generate gaps in food safety control. On all occasions, such breaks in the food chain create non-conformities. A Memorandum of Understanding therefore has to be agreed between the parties and duly signed to settle properly the duties of each. Official agreements between the CA and any other authority in charge of fish or fish products along the fish chain represent the second constraint for the CA.

5.3. At the border post

In some developing countries, the extending of the CA role up to the EU distribution destination markets, at a border inspection post, is not well understood. All countries have to follow the consignment route using the Rapid Alert System for Food and Feed Portal.[97]

At consignment arrival, both random and damaged-looking packaging inspections are carried out by border post fish inspectors using food safety verification tools (physical controls and analyses).[98] Where a standard threshold is exceeded or there is any non-conformity of the product that might affect the consumer or animals, the Rapid Alert System for Food and Feed system is launched.[79,99] Both notifications inform a single person in the CA within 24 hours and, in turn, the CA makes sure that the concerned food business operators are taking appropriate measures. Meanwhile, a comprehensive online network—TRACES (Trade Control and Expert System)—is filled out by the border inspection post service, allowing every EU country to be informed without delay of the existence of the imported faulty product.[99,100,101]

Since 2012, in the case of serious or repeated problems,[102] border post fish inspectors are obliged to retain and sample the next ten consignments of the product concerned from the same origin. If all ten batches produce favourable results, such an obligation is removed.[103] In 2014, the three top causes of border rejection for wild fishery products were temperature failures and spoilage (27 per cent), heavy metals (11 per cent) and histamine (4 per cent).[104] A significant cause also relates to fish poisoning (e.g., puffer fish)[105], concerning the hazardous neurotoxin tetrodotoxin, 430 cases of which have been reported in the five last years, leading to 53 deaths.[104] Additional food safety measures need to be adapted regularly to the current

situation, such as those reflecting the adverse effect of global warming on the expansion of fish distribution in regions where it was absent before, illegal fishing and unsafe home preparation[106].

In Ghana, there have been 12 Rapid Alerts in the three last years, mainly reported as serious.[97] There were due to the overstepping the limit of polycyclic aromatic hydrocarbons (50 per cent), heavy metals (25 per cent) and histamine (7 per cent) thresholds, as well as a few illegal import attempts in the EU (18 per cent). The third constraint relates to import procedures, especially the role of the CA in monitoring the corrective actions of the operator involved with a defective consignment and seeing to avoiding Rapid Alerts.

5.4. Accredited services

In a similar way to testing, an internal control system for the CA is obligatory.[96] A written quality assurance system has to be developed by the CA, corresponding to its activities. In other words, a guarantee has to be obtained that inspections are of the same standard, timely, and carried out by different inspectors. Third party certification, complying with international performance standards such as ISO, will provide this for the CA. Accreditation is defined by ISO 17000 as: "Attestation issued by a third party related to a conformity assessment body conveying formal recognition of its competence to carry out specific conformity assessment tasks."[107] The EU legislation enforces obtaining ISO 17020 in respect of inspecting bodies. Since 2014, the GSA Inspectorate Division is recognised by the ISO 17021 accreditation, offering extra strength to the CA. This is an important tool to facilitate trade, giving confidence to buyers.

Moreover, aside from ISO, seafood authorities may also be interested in becoming accredited to other certification schemes, including food safety and environmental issues, to provide certification to EU fish and fishery products exporters.[108] Other certifications (official or voluntary) of the suppliers may be required by EU buyers to sell their products—e.g. GlobalGAP, British Retail Council, Safe Quality Food, International Food Standard, Friend of the Sea and Marine Stewardship Council. Certifications are also used to sell the products a higher price, the product being put forward in the market.[109] Moreover, EU food safety legislation (ISO 17025:2005) requires that analyses of fishery products be performed at accredited laboratories using EU accredited methods—i.e., gas chromatography, high performance liquid

chromatography operated alone or in combination with mass spectrometry methods (MS or tandem MS/MS). It is necessary to be accredited for each of the different analyses under the EU requested methodology with the proper equipment. Hence, such accredited services require good management from institutions and a proper allocated financial budget to maintain accreditation.

5.5. Food traceability

Implementing traceability from a sanitary perspective allows several essential benefits for the developing country (improving their market access, reducing time spent on product recall, better compliance of the food chain with risk management, etc.). From the CA point of view, traceability requires good organization and record keeping—e.g., inspection monitoring of approved establishment, approval withdrawal of establishments, official sample analysis, export data, and Rapid Alerts. On the other hand, traceability must be implemented by food business operators and must be checked by the CA. Based on Article 18 of Regulation EC N°178/2002[79], traceability requires from the food business operators a system of batching, coding, labelling and registering at every step in the fish chain, requiring a very methodological procedure to be put in place. Operators must also have procedures put in place to recall hazardous products if necessary.

In Ghana, a compound traceability system is executed in the tuna fleet and tuna processing plants, which work together as well as industrial trawlers. Moreover, as some approved establishments are supplied in raw material by semi-industrial and small-scale fishing sectors, the CA has installed further measures and regularly monitors them. A list of authorized vessels supplying fish to approved establishments has to be provided to the CA on request. Moreover, the CA regularly inspects authorized small-scale vessels and authorized fishermen, facilitated by the Fisheries Commission. Monitoring of improved landing sites by the CA was weak in early 2014, probably due to an improper Memorandum of Understanding between the GSA and the Fisheries Commission. [44, 96]

To conclude, countries willing to export fish and fishery products to the EU may be confronted with important institutional constraints. In order to eliminate these, such countries must have a CA comprising sufficient and skilled inspectors, conversant with the Rapid Alert System for Food and Feed system, able to conclude formal agreements with other institutions in the fish chain and to arrange ISO accredited services

(testing and CA certification). Also, food traceability requires a good capacity of organization and record keeping; it is extended upstream (in the files of the CA) and downstream (at food business establishments), covering the whole food production chain.

6. DISCUSSION

This paper provides elements to be adapted not only to the Ghanaian context but also to other African countries, to secure or even to enhance to a certain degree exports of fisheries' products to Europe, while respecting EU regulations. The discussion will start by recalling all the extent of the EU illegal, unreported and unregulated fishing regulations and its implication for fishing resources management that is also essential to export. Then, it will highlight the government's role in supporting the fishery industry, the way the CA handles small-scale fisheries in this process, and the collaboration between the CA and the fishing industry. Moreover, strengthening of testing divisions will, indirectly, achieve these goals. On the other hand, better compliance with EU regulations will be achieved by separating the food safety and testing units.

There should indeed be sustainable fishing stocks, as a result of a correctly executed plan of action to combat illegal, unreported and unregulated fishing. Currently, Ghana has greatly perfected its ocean governance by instituting and applying measures to build up fishery resources—e.g., a reliable sanctioning system, as well as extensive monitoring and control of its fishing fleet by installing vessel monitoring system and automatic identification system on vessels, a satellite detection unit that operates at all times, and access to patrol vessels with trained personnel. Moreover, the country is performing stock assessment research, the results of which will allow the delimitation of closed fishing zones.[13,65] Among the fisheries management plan, measures that permit the growth of additional fish stock and closed fishing seasons are already set up. Also, Regional Fisheries Management Organizations, including the International Commission for the Conservation of Atlantic Tunas (ICCAT), will take extra measures. These aim at further strengthening flag states' management plan so as to synchronise Catch Certificates, making it possible for several end-markets to gain in power—e.g., harmonizing vessels' registry, listing of illegal, unreported and unregulated vessels, and regional monitoring control and surveillance system.[10,14]

Significant investments from the fishing industry are necessary for upgrading food safety to the level required in the EU market, particularly costly infrastructure for small and medium enterprises—e.g., refrigerated storage and transportation, and processing machines. Moreover, EU importers are nowadays requesting more and more certifications (food safety and sustainable-related) from their supplier in the fishing industry[109]—e.g., British Retail Council, Safe Quality Food, Food Standard Certification, Marine Stewardship Council, and others. The government should provide the fishing industry with the possibility of attending local specific private and voluntary certification training workshops, as well as having a closer look at contributing to the cost. The government could also subsidize, on case-study, some small and medium enterprises to improve the infrastructure for higher food safety. Such public-private partnerships have been observed in Mauritius and India, where the governments played an active role in boosting the sector. In the same way, a platform hub was created in Mauritius with private and public sector representatives to take charge of all the sourcing of value-added services necessary for marketing and obtaining supplies at a reduced price.[110] The money invested will somehow come back to the country and the consumers in terms of higher food safety.[16,111]

When the CA deals with approved processing establishments exporting to the EU which are small and medium enterprises, supplied by small-scale fishermen, food business operators have to make sure that the supplier respects demanding food safety conditions.. Establishments indeed have to guarantee that the supplier is observing EU food safety regulations, in particular N°852/2004 (hygiene practices for the fisherman) and N°853/2004 (primary production vessel and improved landing site). The CA must be provided by the concerned food business operators with a list of authorized fishermen and authorized canoes they have selected. Besides, while the fisherman commits to adhere to the food safety procedure taught by the plant, the plant in return provides at least the approved standard ice-box and flake-ice coming from the plant. Furthermore, it is crucial that the authorized canoes berth only in an officially listed, improved landing site, in line with EU regulations, to avoid contamination of the fish. Improved landing sites are located in an enclosed area, where good hygienic practices take place and where the surroundings represent no hazard to food safety. In all this process, particular attention must be paid to traceability and record keeping (e.g., canoe, fisherman, date, fishing zone, ice-box). Monitoring of the authorized fisherman and the authorized canoe by the plant is continuous, guaranteeing the safety of the product. In addition, on a regular basis

established between establishments and CA fish inspectors, the latter monitors with the former, authorized fishermen and canoe. Monitoring of the safety of approved landing sites is carried out by the fisheries authorities or the CA officers.[112] Additionally, a growing trend in small-scale fisheries is to create national or local labels for sustainable and quality fishing, further enhancing the confidence of EU importers. Among them, one is set up in the Seychelles for high-quality fish, guaranteeing the origin, the quality, the traceability and sustainability of hook-and-line fishing.[113] Senegal also has listed improved landing sites obeying sustainable fishing and quality rules.[114])

A climate of trust between the CA and the fishing industry is necessary for exports to conform.[112] Even though the CA has a regulatory inspection function in respect of the fishing industry and may impose penalties or withdrawal of the approval to export, it is better that the CA and fish exporters—and, also their professional organizations—have a sound understanding and communicate effectively with each other. When non-conformities are noticed, follow-up inspections have to be undertaken in an agreed time frame. In Ghana, to maintain this positive climate, several actions organized by the GSA are proposed to the food business operators—e.g., food safety and quality training workshops, update meetings with the CA, supply of other certifications, testing of the food business operators' own checks, or best food business operator contests.

Shortening the time delay in delivering a test will also guarantee exports. Official fish and fishery products testing services should be promoted in the country so as to produce results within a satisfactory time span for the CA and food business operators. Finance of the division should be periodically evaluated to serve this general objective. Moreover, it is important to consider improving the number of laboratory staff in regard to the size of the fishery industry, providing training in the new testing reference methods required, and updating equipment and materials.[44] On the other hand, even better compliance with EU regulations—including the avoidance of conflict of interest—would be attained by separating food safety control work from the testing function rather than further developing the close link between them. In this respect, several situations are met in developing countries. Most commonly, both tasks pertain to one entity—e.g., two separate departments in one agency of a ministry in Ghana, two separate technical agencies of a ministry in Benin. Conversely, better organization is observed in Mauritius, where the CA is in a ministry and the official laboratory is private, or in Nigeria, which is working on reinforcing the food safety function in public

institutions, before creating a separate food safety agency, covering the whole fish chain "from catch to fork".[77,,115,116]

7. CONCLUSION

It is a real issue for developing countries to meet the terms of EU requirements to export fishery products, in terms of both food safety and illegal, unreported and unregulated fishing issues. The objective of this paper is to define the key institutional food safety challenges and constraints of a developing country, such as Ghana, in exporting fishery products to European countries. Sanitary challenges are well-defined in EU import measures. A fully resourced and organized CA has to provide skilled and equipped staff together with on-the-job training, commensurate with the size of approved establishments, to achieve official controls according to EU-compliant national food safety regulations. Both accredited testing services (in the various analyses requested) and accredited CA certification must be implemented. Where necessary, formal agreements have to be concluded between institutions to keep the whole value chain under control, including the small-scale sector. Food safety traceability extends upstream (in CA files) and downstream (at food business establishments) to cover the whole food production chain. The CA must be able to manage Rapid Alerts correctly, making sure corrective actions are executed by the food business operators and as well, enhancing their control system to avoid Rapid Alerts.

Given sustainable management of the country's fishery resources, it should then be decided to further develop exports of fishery products to the EU. Within these limits, the government should support the fishery industry to allow more establishments to be approved, contributing to the cost of additional food safety equipment or certifications. Authorized small-scale fishermen, under some strict food safety conditions, can supply small and medium enterprises, also benefiting from secure employment.

The major findings of the analysis are, first of all, the growing difficulty of institutions in adapting to more and more stringent EU regulations and developing new sets of domestic rules; and, secondly, the lack of collaboration between key institutions, which does not allow the setting up of efficient food safety systems. These findings are important not only for Ghana but also for the other countries that are currently

exporting fish to Europe or who wish to do so, as well as in other agricultural exports where similar malfunctions are occurring.

Acknowledgements

This work was supported by the UNIDO/MOTI Trade Capacity Building Programme for Ghana. We thank all government agencies and institutions in Ghana that assisted us. We are particularly grateful to Mrs. Jessica Nkansah, Head of the Competent Authority (GSA), and Mr. Samuel Quaatey, Director of the Fisheries Commission, for their read-through and comments.

References

(01) EUMOFA, The EU fish market, **2015**. http://www.eumofa.eu/eumofa-publications (Accessed 31st December 2016)

(02) Gill TA and Akio Kobayashi, Seafood—quality and evaluation. Food Reviews International, Special Issue, **1990**; *6* (4), 431–435. http://www.tandfonline.com/doi/abs/10.1080/87559129009540885 (Accessed 30th December 2016)

(03) Count done in September 2016. https://webgate.ec.europa.eu/sanco/traces/output/non_eu_listsPerActivity_en.htm# (Accessed 26th September 2016).

(04) EC Council Regulation (EC) No 1005/2008 to establish a community system to prevent, deter and eliminate illegal, unreported and unregulated fishing (IUU), **2008**; 32 pp. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:286:0001:0032:EN:PDF (Accessed 26th September 2016)

(05) EC Council Regulation (EC) No 1010/2009 to implement the No 1005/2008 IUU system, **2009**; 37 pp. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009R1010&from=EN (Accessed 26th September 2016)

(06) Failler P, The ACP group of states and the challenge of exporting fish to the European Union. Journal of Fisheries and Livestock Production, **2015**; *3* (3), 141–143.

(07) Leroy Antonia, Florence Galletti and Christian Chaboud, The EU restrictive trade measures against IUU fishing. Marine Policy, **2016**; *64*, 82–90.

(08) Petrossian Gohar A, Preventing illegal, unreported and unregulated (IUU) fishing: A situational approach. Biological Conservation, **2015**; *189*, 39–48.

(09) Young Margaret A, International trade law compatibility of market-related measures to combat illegal, unreported and unregulated (IUU) fishing. Marine Policy, **2016**; *69*, 209–219

(10) Hosch G, Trade measures to combat IUU fishing: Comparative analysis of unilateral and multilateral approaches. International Institute for Sustainable Development and International Centre for Trade and Sustainable Development, Geneva, Switzerland, **2016**; www.ictsd.org (in press).

(11) Failler P, Fishery and aquaculture industry in Ghana. ATLAFCO, Morocco, **2012**; 51 pp.

(12) Failler P, and H. El Ayoubi, Monitoring control and surveillance (MCS): An efficient tool to fight against IUU fishing. Review of the MCS progress implementation in the 22 African countries bordering the Atlantic. ATLAFCO, Morocco, **2015**; 37 pp.

(13) Quaatey Samuel, The initiatives of Ghana in the fight against IUU fishing in Failler P., Hayat Assara and Papa Gora Ndaye, Monitoring, control and surveillance (MCS): An effective tool to fight against IUU fishing. Tuna Transparency Initiative (TTI) in ATLAFCO zone. Report of the Workshop n°1, Marrakech, Morocco, 27–28 October **2015**; 65 pp.

(14) Tsamenyi Martin, Key elements of the success of the implementation of the MCS tools, particularly in the context of the implementation of the national plan of action against IUU fishing in Failler P, Hayat Assara and Papa Gora Ndaye, Monitoring, control and surveillance (MCS): An effective tool to fight against IUU fishing. Tuna Transparency Initiative (TTI) in ATLAFCO zone. Report of the Workshop n°1, Marrakech, Morocco, 27–28 October **2015**; 65 pp.

(15) Asiama, J, I Abdulai, S Dotse and E Addison, The fishing sub-sector and Ghana's economy, Research Department, Bank of Ghana, **2008**; 34 pp.

(16) Suharni Rahmata, Chew Boon Cheongb, Mohd Syaiful and Rizal Bin Abd Hamid, Challenges of developing countries in complying with quality and enhancing standards in food industries. In 6th International Research Symposium in Service Management, Malaysia. Procedia: Social and Behavioral Sciences, **2016**; *224*, 445–451.

(17) MoFAD, Fisheries regulations [LI1968], Accra, Ghana, **1968**; 71 pp. http://www.fishcom.gov.gh/images/Ghana_Fisheries_Regulations_[LI1968].pdf (Accessed 31st December 2016)

(18) Brett Koense, Review—A summary of the United States Food and Drug Administrations' food safety program for imported seafood; One country's approach. Foods, **2016**; *5* (31), 9 pp.

(19) Mensah, I, An analysis of the performance of Ghanaian canned tuna export to EU market (1999–2009). University of Tromso, Norwegian College of Fisheries Sciences. Master's Thesis, **2010**; 65 pp.

(20) Nunoo FK, B Asiedu, K Amador, D Belhabbib, V Lam, R Sumalia and D Pauly, Marine fisheries catches in Ghana: Historic reconstruction for 1950 to 2010 and current economic impacts. Reviews in Fisheries and Aquaculture, **2014**; *22* (4), 274–283.

(21) MoFAD, Fisheries Commission. Exported fish 2008 to 2013 and Export Data projection for 2014. Working document, Accra, Ghana, **2014**; 3 pp.

(22) MoFAD, Fisheries Commission. 2012 Annual Report, Accra, Ghana, **2013**; 45 pp.

(23) DEFRA, Important information regarding the import of West African fish products into EU and UK Markets. Department for Environment Food and Rural Affairs, London, UK, **2013**; 2 pp. www.seafish.org/media/771007/letter%20to%20tuna%20importers%20130227.pdf (Accessed 31st December 2016)

(24) Campling, L, Tariff escalation and preferences in international fish production and trade. E15 Initiative. Geneva: International Centre for Trade and Sustainable Development (ICTSD) and World Economic Forum, **2015**; 32 pp. www.e15initiative.org/

(25) EC, Article 2611, Memo 13-1053 IUU Ghana, **2013**; 2 pp. http://europa.eu/rapid/press-release_MEMO-13-1053_en.htm (Accessed 30th December 2016)

(26) EC, Article 2611, Press release IUU Ghana, **2013**; 2 pp.

(27) Eurostat Database, International trade detailed data for fish and crustaceans, molluscs and other invertebrates. http://ec.europa.eu/eurostat/data/database (Accessed 30th December 2016).

(28) FAO, Country Profile Ghana Narrative, **2016**. http://www.fao.org/fishery/facp/GHA/en (Accessed 30th December 2016)

(29) MOFAD, Working document. Revenue generated from MOFAD (2010–2015).

(30) MOFAD, Fisheries Commission Annual Report 2015; **2015** ; 70 pp.

(31) http://agritrade.cta.int/Fisheries/Topics/Market-access/Ghana-and-Seychelles-will-cooperate-to-boost-tuna-exports-to-the-EU

(32) http://www.mofad.gov.gh/publications/statistics-and-reports/fish-production/

(33) Asiedu B, P Failler and Y Beyens, The performance of tuna processing fishery sector to sustainable fish trade and food security in Ghana. JENRM, **2015**; *2* (1), 8–1. http://uenr.edu.gh/jenrm/wp-content/uploads/2015/11/002__Berchie.pdf (Accessed 31st December 2016)

(34) Berchie Asiedu, P Failler and Y Beyens, Enhancing aquaculture development: Mapping the tilapia aquaculture value chain in Ghana. Review in Aquaculture, **2015**;*7*, 1–9. http://onlinelibrary.wiley.com/doi/10.1111/raq.12103/abstract (Accessed 30th December 2016)

(35) EC, Article 5738. Press release IUU. Memo, **2015**; 2 pp. http://europa.eu/rapid/press-release_MEMO-15-5738_en.htm (Access December 31st 2016)

(36) EC, Press release IUU. Commissioner congratulates Ghana on progress made in the fight against illegal fishing, **2015;** 3 pp**.** https://ec.europa.eu/fisheries/commissioner-congratulates-ghana-progress-made-fight-against-illegal-fishing_en (Accessed 31th December 2016).

(37) http://ec.europa.eu/food/safety/docs/ia_trade_import-cond-fish_en.pdf (Accessed 30th December 2016).

(38) EC, Council Directive No 91/493/EEC of 22 July 1991 laying down the health conditions for the production and the placing on the market of fishery products, **1991**; 20 pp. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31991L0493&from=FR. (Accessed 30th December 2016)

(39) Reichelt-Brushett Amanda J, Geochemistry and mercury contamination in receiving environments of artisanal mining wastes and identified concerns for food safety. Environmental Research, **2017**;152:407-418. https://www.ncbi.nlm.nih.gov/pubmed/27471051

(40) https://ec.europa.eu/fisheries/cfp/illegal_fishing_en (Accessed 30th December 2016)

(41) FAO, The state of the world fisheries and aquaculture: Opportunities and challenges. United Nations for Food and Agriculture, Rome, Italy, **2016**; 204 pp. http://www.fao.org/3/a-i5555e.pdf (Accessed 30th December 2016)

(42) FAO, The state of the world fisheries and aquaculture: Opportunities and challenges. United Nations for Food and Agriculture, Rome, Italy, **2014**; 243 pp. http://www.fao.org/3/a-i3720e.pdf (Accessed 30th December 2016)

(43) FVO, Approved Establishments Ghana No 055, **2016**; 4 pp. https://webgate.ec. europa.eu/sanco/traces/output/GH/FFP_GH_en.pdf (Accessed 27th September 2016).

(44) Failler P, Y Beyens and B Asiedu, Value chain analysis of the fishery sector in Ghana. Mission Report, Trade Capacity Building Project for Ghana, UNIDO/MOTI TCB Project, Accra, Ghana, **2014**; 106 pp.

(45) FVO, Final audit report n° 6707 Fishery Products (export) in Ghana, **2013**; 25 pp. http://ec.europa.eu/food/fvo/audit_reports/index.cfm (Accessed 30th December 2016)

(46) FVO, Final report of a mission n°7575 in Ghana, Dublin, Ireland, **2005**; 13 pp. http://ec.europa.eu/food/fvo/audit_reports/index.cfm (Accessed 30th December 2016)

(47) FVO, Final report of a mission n°7659 in Ghana, Dublin, Ireland, **2008**; 17 pp. http://ec.europa.eu/food/fvo/audit_reports/index.cfm (Accessed 30th December 2016)

(48) FVO, Final report of a mission n°8818 in Ghana, **2010**; 19 pp. http://ec.europa.eu/food/fvo/audit_reports/index.cfm (Accessed 30th December 2016)

(49) MoTi website. http://www.ghanatrade.gov.gh/ (Accessed 30th December 2016).

(50) GSA website. http://www.gsa.gov.gh/ (Accessed 30th December 2016).

(51) MoTi Standards Authority Act, N.R.D.175, Accra, Ghana, **1973**; 11 pp. http://www.ghanatrade.gov.gh/images/products/laws/STANDARDS%20AUTHORITY%20ACT,1973.pdf (Accessed 31st December 2016)

(52) EC, Commission Decision (EC) No 98/421/EC laying down the conditions of fishery products imports from Ghana, **1998**; 5 pp http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31998D0421&from=FR (Accessed 31st December 2016)

(53) Goulding I, African Union Food Safety Authority. Status report September 2015 in African meeting World Seafood Congress' 4–9 September **2015**; 7 pp.

(54) AU, Recommendations for the missions, functions and structure of African union food safety authority and a Rapid Alert System for Food and Feed. Proposal of Establishment, **2016**; 24 pp.

(55) FDA website. http://www.fdaghana.gov.gh/ (Accessed 27th September 2016).

(56) MoFAD website. http://www.mofad.gov.gh/ (Accessed 30th December 2016).

(57) MoFAD, Fisheries Commission. http://www.mofad.gov.gh/publications/laws-and-regulations/ (Accessed 31st December 2016).

(58) MoFAD, Fisheries Commission. Fisheries Act 2002, Act 625; **2002**; 66 pp. http://www.mofad.gov.gh/fisheries-act-2002-act-625/ (Accessed 30th December 2016)

(59) MoFAD, Fisheries Commission. Fisheries Regulations 2010, Arrangement of Regulations, **2010**; 45 pp. http://www.mofad.gov.gh/wp-content/uploads/2016/05/Fisheries-Regulations-2010.pdf (Accessed 30th December 2016)

(60) MoFAD, Fisheries Commission, Ghana Fisheries Regulations LI 1968; **1968**; 71 pp. http://faolex.fao.org/docs/pdf/gha151991.pdf (Accessed 30th December 2016)

(61) MoFAD, Fisheries Commission, Ministerial Directive for Minimum Sanitary Requirements for Vessels Operators, **2016**; 4 pp. http://www.mofad.gov.gh/wp-content/uploads/2016/06/Ministerial-Directive-on-Minimum-Sanitary-For-Vessels-31-5-2016.pdf (Accessed 30th 2016)

(62) Republic of Ghana Fisheries and Aquaculture Sector Development Plan (2011–2016). WARFP, Ghana,**2011**; 33 pp.

(63) MoFAD, Fisheries Commission, The Fisheries Management Plan of Ghana, The National Policy for the Management of the Marine Fisheries Sector, (2015-2019), Republic of Ghana, **2015**; 56 pp. http://mofad.gov.gh/wp-content/uploads/2016/07/FISHERIES-MANAGEMENT-PLAN-OF-GHANA.pdf (Accessed 30th December 2016)

(64) Nunoo, FKE, B Asiedu, K Amador, D Belhabib and D Pauly, Reconstruction of marine fisheries catches for Ghana, 1950–2010. Fisheries Centre, The University of British Columbia Working Paper Series Working Paper. **2014**; *13*, 26 pp. http://www.seaaroundus.org/doc/publications/wp/2014/Nunoo-et-al-Ghana.pdf (Accessed 30th December 2016)

(65) Minister Sherry Ayittey's declaration on the lift of the IUU yellow card in October 2015. http://ec.europa.eu/avservices/video/player.cfm?sitelang=en&ref=I114307&videolang=INT (Accessed 30th December 2016)

(66) MoFAD, Fisheries Commission, National Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported, and Unregulated Fishing, Republic of Ghana; **2014**; 30 pp. ftp://ftp.fao.org/fi/DOCUMENT/IPOAS/national/Ghana/NPOA_IUU.pdf (Accessed 30th December 2016)

(67) MoFAD, Fisheries Commission, Fisheries (Amendment) Act 2014, **2014;** 9 pp. http://mofad.gov.gh/wp-content/uploads/2016/07/FISHERIES-AMENDMENTACT2014.pdf (Accessed 30th December 2016)

(68) MoFAD, Fisheries Commission, Fisheries (Amendment) Regulations L.I. 2217 2015, **2015**; 12 pp. http://mofad.gov.gh/wp-content/uploads/2016/07/FISHERIES-AMENDMENT-REGULATIONS-2015.pdf (Accessed 30th December 2016)

(69) http://www.warfp.gov.gh/ (Accessed 28th September 2016).

(70) Goulding I, WARFP, Inception Workshop Presentation, Accra, Ghana, **2014**; 19 pp.

(71) Palma C, P Pallares, M Ortiz, and L Kell, Review of the available Ghana statistics on tropical fisheries. Collect. Vol. Sci. Pap. ICCAT. **2012**; *68* (3), *1180–1193.*

(72) Fonteneau A, P Bannerman, S Ayivi and V Nordstrom. New task (catch and effort, catch at size) statistics estimated in 2013 for the Ghanaian fleet during the 1996–2005 period. Collect. Vol. Sci. Pap. ICCAT. **2014**; *70* (6), 2556–2594.

(73) http://www.crc.uri.edu/projects_page/sfmp/ (Accessed 25th September 2016).

(74) MoFAD, Ghana national aquaculture development plan. Ministry of Food and Agriculture, Fisheries Commission, Accra, Ghana, **2012**; 86 pp. http://www.mofad.gov.gh/publications/laws-and-regulations/ (Accessed 30th December 2016)

(75) MoFAD, Fisheries Commission. 2011 Annual Report, Accra, Ghana, **2012**; 73 pp.

(76) Ghana Revenue Authority. http://www.gcnet.com.gh/ (Accessed 31st December 2016).

(77) Neeliah SA and D Goburdhun, National food control systems: A review. Food Reviews International, **2007**; *23* (1), 35–51. http://dx.doi.org/10.1080/87559120600998148 (Accessed 27th September 2016).

(78) Requested guarantees from food establishments of third countries. https://ec.europa.eu/food/safety/international_affairs/trade/non-eu-countries_en (Accessed 31st December 2016).

(79) EC, Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety, 2002; 24 pp. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32002R0178&from=EN (Accessed 30th December 2016)

(80) http://ec.europa.eu/food/safety/general_food_law_en (Accessed 30th December 2016). The purpose of this subchapter is to outline the core legal documents.

(81) EC, Regulation (EC) No 882/2004 of the European Parliament and of the Council of 29 April 2004 on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules, **2004**; 141 pp. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32004R0882&from=EN (Accessed 30th December 2016)

(82) EC, Regulation (EC) No 852/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs, **2004**; 54 pp. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:139:0001:0054:en:PDF (Accessed 30th December 2016)

(83) Tzouros NE and IS Arvanitoyannis, Implementation of hazard analysis critical control point (HACCP) system to the fish/seafood industry: A review. Food Reviews International, **2000**; *16* (3), 273–325.

(84) EC, Regulation (EC) No 853/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific hygiene rules for food of animal origin, **2004**; 61 pp. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32004R0853R(01)&from=EN (Accessed 30th December 2016)

(85) EC, Regulation (EC) No 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organisation of official controls on products of animal origin intended for human consumption, **2004**; 45 pp. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:226:0083:0127:EN:PDF (Accessed 30th December 2016)

(86) EC, Commission Regulation (EC) No 2073/2005 on microbiological criteria in foodstuffs, **2005**; 26 pp.. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32005R2073&from=en (Accessed 30th December 2016)

(87) EC, Commission Regulation (EC) No 1019/2013 histamine in fishery products, **2013**; 2 pp. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1019&from=EN (Accessed 30th December 2016)

(88) EC, Commission Regulation (EC) No 2074/2005 laying down implementing measures for certain products, **2005**; 33 pp. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2005:338:0027:0059:EN:PDF (Accessed 30th December 2016)

(89) EC, Commission Regulation (EC) No 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs, 2006; 20 pp. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:364:0005:0024:EN:PDF (Accessed 30th December 2016)

(90) EC, Commission Regulation (EC) No 629/2008 amending Regulation (EC) No 1881/2006 setting maximum levels for certain contaminants in foodstuffs, **2008**; 4 pp. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:173:0006:0009:EN:PDF (Accessed 30th December 2016)

(91) EC, Commission Regulation (EC) No 835/2011 amending Regulation (EC) No 1881/2006 as regards maximum levels for polycyclic aromatic hydrocarbons in foodstuffs, **2011**; 5 pp. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:215:0004:0008:En:PDF (Accessed 30th December 2016)

(92) EC, Council Directive No 98/83/EC of 3 November 1998 on the quality of water intended for human consumption, **1998**; 23 pp. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1998:330:0032:0054:EN:PDF (Accessed 30th December 2016)

(93) GSA, Ghana Standards Authority Documentation Centre. Fish and Fishery Products – Regulations GS FPR 1: **2007**; xx.

(94) GSA, Response of the competent authorities of Ghana to the recommendations of report ref. DG(SANCO)/2013-6707-MR, **2013**; 4 pp**.**

(95) GSA, Ghana Standards Authority Documentation Centre. Handbook Inspection of High Risk Goods, Accra, Ghana, **2014**; 13 pp. www.gsa.gov.gh

(96) EC, Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products, 2008; 18 pp. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008R0765&from=EN (Accessed 30th December 2016)

(97) https://webgate.ec.europa.eu/rasff-window/portal/?event=SearchForm&cleanSearch=1

(98) No-Seong Kwak, Comparative analysis of the imported food control systems of the Republic of Korea, Japan, the United States, and the European Union. Food Review International. **2014**; *30* (3), 225–243. http://dx.doi.org/10.1080/87559129.2014.913293 (Accessed 30th December 2016)

(99) EC, Commission Regulation (EC) No 16/2011 of 10 January 2011 laying down implementing measures for the Rapid Alert System for Food and Feed, **2011**; 4 pp. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:006:0007:0010:EN:PDF (Accessed 30th December 2016)

(100) EC, Commission Decision of 30 March 2004 on the introduction of the TRACES system and amending Decision No 92/486/EEC, **2004**; 5 pp. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02004D0292-20050719&from=EN and general website http://ec.europa.eu/food/animals/traces/index_en.htm (Accessed 5th May 2016).

(101) EC, Border Inspection, Better Training for Safer Food, European Commission, **2013**; 28 pp. http://ec.europa.eu/chafea/documents/food/food-border-inspection_en.pdf (Accessed 30th December 2016)

(102) Such provision is stipulated in Article 24 of the Council Directive No 97/78/EC of 18 December 1997 laying down the principles governing the organisation of veterinary checks on products entering the Community from third countries, **1997**; 22 pp. file:///C:/Users/Utilisateur/Desktop/CELEX%253A31997L0078%253AEN%253ATXT.pdf (Accessed 2^{6t}h September 2016)

(103) RASFF, 2012 Annual Report European Commission. Rapid Alert System for Food and Feed, **2013**; 60 pp. http://ec.europa.eu/food/safety/rasff/docs/rasff_annual_report_2012_en.pdf (Accessed 26th September 2016)

(104) Bartolo I, Developments in legislation impacting seafood imports into the EU. Proceedings of the World Seafood Congress, Grimsby, UK, Sept. 05–09, Seafish, **2015**; 18 pp.

(105) Inês Panãoa, Conrado Carrascosab, José Raduán Jaberc and António Raposo. Puffer fish and its consumption: To eat or not to eat? Food Reviews International, **2016**; *32* (3), 305–322. http://Dx.Doi.Org/10.1080/87559129.2015.1075213 (Accessed 30th December 2016)

(106) Scheelbeek Pauline, Samuel Treglown, Tony Reid and Peter Maes, Fish preparation hygiene and cholera in Monrovia, Journal of Infection in Developing Countries, **2009**; 3*(9)*:727-731. http://www.jidc.org/index.php/journal/article/view/19858575 (Accessed 31st December 2016)

(107) http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=29316 (Accessed 31st December 2016)

(108) Washington, S and L Ababouch, Private standards and certification in fisheries and aquaculture: Current practice and emerging issues. FAO Fisheries and Aquaculture Technical Paper. No. 553. Rome, Italy. **2011**; 181 pp. http://www.fao.org/docrep/013/i1948e/i1948e.pdf (Accessed 31st December 2016)

(109) FAO, A practical manual for producers and exporters from Asia: Regulations, standards and certification for agricultural exports. Food and Agriculture Organization of the United Nations, RAP Publication 2007/13; **2007**; 67 pp.

(110) Shalini A Neeliah, Harris Neeliah and Daya Goburdhun, Sanitary and phytosanitary issues for fishery exports to the European Union: A Mauritian insight. Journal of Development and Agriculture Economics, **2011**; *3* (2), 56–68. (Accessed 31st December 2016)

(111) Juthathip Jongwanich. The impact of food safety standards on processed food exports from developing countries. Food Polic., **2009**; *34* (5), 447–457.

(112) Buckley J. Food safety regulation and small processing: A case study of interactions between processors and inspectors. Food Policy, **2015**; *51*, 74–82. http://jeniferbuckley.com/wp-content/uploads/Buckley-2015-Food-Policy.pdf

(113) http://www.seychelles-hookandline-fishermen.org/en/accueil.html (Accessed 30th December 2016)

(114) http://www.begellek.org/quest-ce-que-beg-ellek/ (Accessed 30th December 2016)

(115) FAO/WHO, Assuring food safety and quality. Guidelines for strengthening national systems. Food and Nutrition Paper, United Nations for Food and Agriculture, Rome, Italy, **2003**; *76*, 80 pp. ftp://ftp.fao.org/docrep/fao/006/y8705e/y8705e00.pdf (Accessed 30th December 2016)

(116) FVO, Final Report of an audit carried out from 22 and 30 January 2014 in Mauritus, No 7138, 2014; 28 pp. http://ec.europa.eu/food/audits-analysis/audit_reports/details.cfm?rep_id=3277 (Accessed 30th December 2016)